April 6, 1942

STEEL

PUBLIC L
APR 6
DETROIT

PRODUCTION • PROCESSING • DISTRIBUTION • USE

ESTABLISHED 1882

TECHNOLOGY DEPT.

INLAND

We're Fighting This War Together

The men who carry guns, fly bombers and fire torpedoes are our *first* line of action. But no less important is the work of men in the *second* line—men who make these guns, bombers and torpedoes.

Our job here at Inland is to make the steel that is so necessary to win this war. Inland steelmakers feel their responsibility keenly. They have smashed all previous production records. They are giving up their holidays to maintain the highest possible rate of operation. They are working arm in arm with the men in service.

INLAND STEEL CO.

Jobber Delivers Vital Equipment 8 months ahead!

Suppose you were manufacturing machine tools that were indispensable to War Production—and *Suppose* you required a new piece of gauging equipment for a high-precision job and held the necessary Priority but couldn't get factory delivery for at least 8 months:—

What then?

Well, if you were already making proper use of *your* Industrial Supply Distributor, you naturally would go to him first. And right there the "supposing" ends—for here is exactly what followed in that Manufacturer's experience:

He found his local Jobber:—

1—already had the Precision Gauge in stock;

2—had a Priority of his own that he could apply immediately;

3—The Jobber *could* and *did* deliver in a week.

Actually the Distributor's foresight enabled the Manufacturer to add the equal of **2/3ds of a year** to his priceless, all-too-limited production time.

Your own Jobber can and will help *you*—not so dramatically every time but always *soundly*—enabling you to co-operate with other manufacturers in increasing the Nation's total volume of fighting material.

You can depend on their teamwork—just as *we* have, during the many years in which Mill Supply Companies have served as this Company's exclusive Distributors of Cle-Forge High-Speed Drills and Peerless High-Speed Reamers over every square mile of Industrial America.

This incident is typical of the unusual services that many Mill Supply Distributors are rendering their customers during the Emergency.

The CLEVELAND TWIST DRILL COMPANY
1242 EAST 49th STREET
CLEVELAND

TRADE MARK REG. U. S. PAT. OFF. AND FOREIGN COUNTRIES

30 READE ST. NEW YORK · 9 NORTH JEFFERSON ST. CHICAGO · 650 HOWARD ST. SAN FRANCISCO
6515 SECOND BLVD. DETROIT · LONDON - E. P. BARRUS, LTD. - 35-36-37 UPPER THAMES ST., E.C.4

"CLEVELAND" DISTRIBUTORS EVERYWHERE ARE READY TO SERVE YOU

3 new Moly Tool Steels

BETHLEHEM STEEL

Bethlehem's three new molybdenum steels—"66," "H. M.", and "Hot Work 8"—are now thoroughly shop-proved. With proper heat-treatment and preparation these moly steels will do just as good a job as did their high-tungsten brothers.

If you use high-speed steel or hot-work steel, we suggest you investigate the possibility of using these new Bethlehem grades in your shop. Brief descriptions of the steels and their recommended heat-treatment follow:

H. M.—A High-Speed Steel with approximately 8 per cent molybdenum and 1½ per cent tungsten. Preheat H. M. to between 1300 and 1500 deg. F. and forge between 1900 and 1950 deg. F. Pack-anneal at 1550 deg. F. Harden by preheat to 1600 deg. F., high-heat to 2240 deg. F., and oil-quench. Temper at 1050 deg. F.

Care should be taken to protect H. M. against decarburization. Avoid excessive soaking at forging temperature. Protection is afforded by sprinkling borax on the steel at approximately 1000 deg. F. Use a steel plate to protect the furnace hearth from the corrosive action of the borax.

66—A High-Speed Steel with approximately 5 per cent tungsten and 5 per cent molybdenum. This steel may be handled exactly the same as 18-4-1 with the exception that it is quenched at a temperature of 75 to 100 deg. F. lower than 18-4-1. Bethlehem 66 is not subject to excessive decarburization. It has a high degree of red-hardness. Taken together, H. M. and 66 will handle virtually all jobs formerly handled by high-tungsten tool steels.

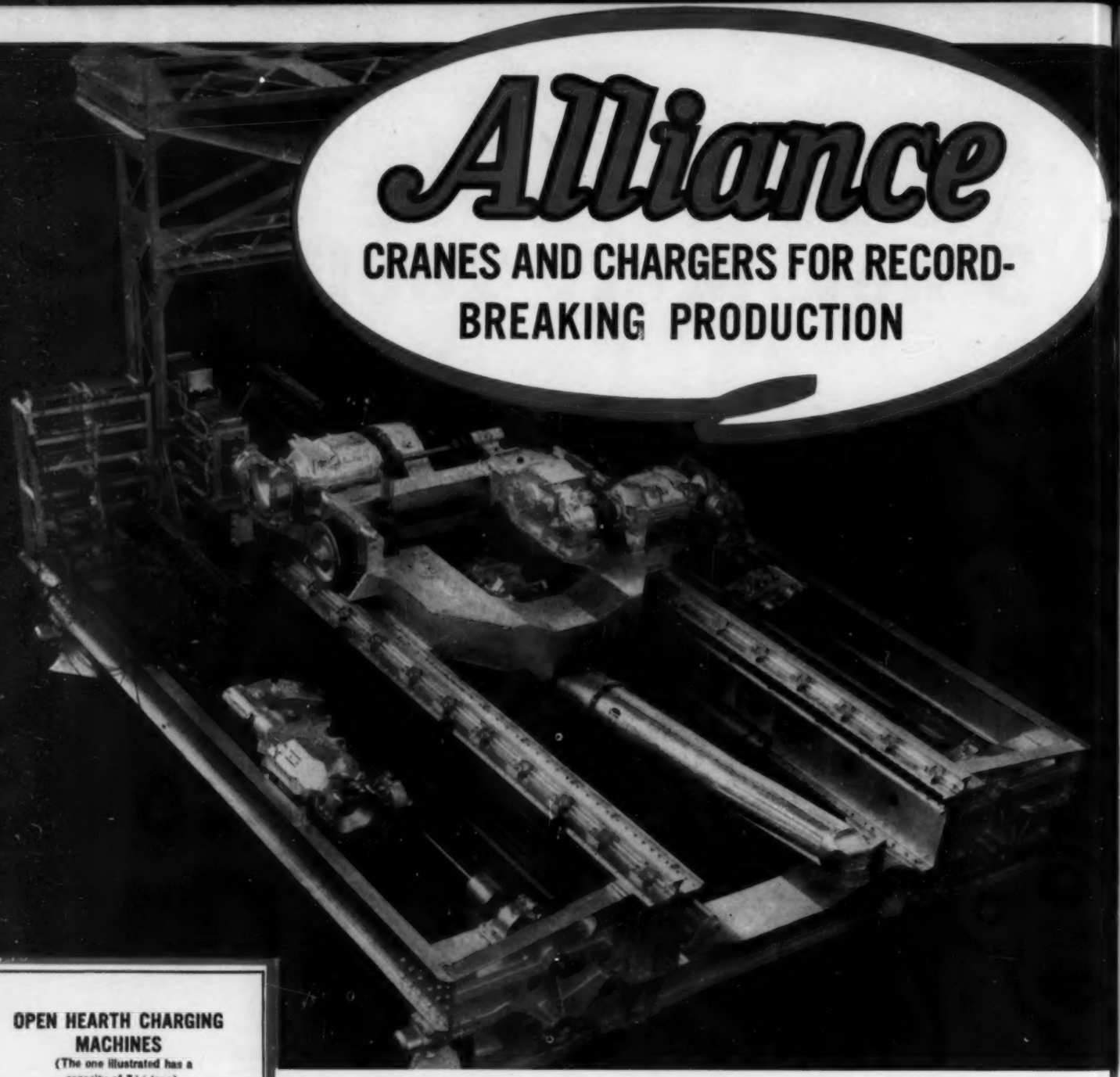
Hot Work 8—A Hot-Work Steel with approximately 8½ per cent molybdenum and 1½ per cent vanadium. This steel replaces Bethlehem's No. 57 Hot Work. It stays tough, withstands both shock and abrasion at elevated temperatures, and resists both "heat-checking" and "washing." Should be pack-annealed at 1550 deg. F. For best results in hardening, preheat to 1500 deg. F., bring slowly to 2200 deg. F. in high-heat furnace and oil-quench; temper at 1120 to 1280 deg. F. Do not water-quench Hot Work 8.

Write for literature giving more detailed information about these new molybdenum tool steels and their recommended treatment. Address Bethlehem Steel Company, Bethlehem, Pa.

BETHLEHEM STEEL COMPANY

Alliance

CRANES AND CHARGERS FOR RECORD-BREAKING PRODUCTION



OPEN HEARTH CHARGING MACHINES
(The one illustrated has a capacity of 7½ tons)

•

LADLE CRANES

•

GANTRY CRANES

•

SOAKING PIT CRANES

•

STRIPPER CRANES

•

SLAB AND BILLET DRAWING MACHINES

UNFALTERING SERVICE

OPERATORS MANIPULATE Alliance cranes and chargers with uncanny accuracy; and record-breaking tonnage is handled smoothly, rapidly and safely. This is not by accident. Alliance engineers carefully survey customers' requirements and properties before commencing construction drawings. With this important research data supported by world-wide experience, they design SPECIAL cranes and chargers which synchronize production with plant facilities. Furthermore, Alliance cranes and chargers operate full time year after year without maintenance difficulties. Compare their ruggedness with the specifications of any others. It's worth-while, we assure you.

THE ALLIANCE MACHINE CO. - ALLIANCE, OHIO

MACKLIN
GRINDING WHEELS

Macklin Wheels Are Uniform

After many carefully supervised manufacturing processes MACKLIN high quality grinding wheels must be speed tested. Mounted in specially designed speed testers the wheels are run at revolutions per minute far in excess of those recommended for actual operation. Speeds are checked on accurate gauges and results of all tests are entered on sworn affidavits that are kept as permanent records. *"Protect Your Production"* with MACKLIN grinding wheels that are always uniform.

Ask for MACKLIN engineering service.

MACKLIN COMPANY

Manufacturers of GRINDING WHEELS — JACKSON, MICHIGAN, U. S. A.

Distributors in all principal cities

Sales Offices: — Chicago - New York - Detroit - Pittsburgh - Cleveland - Cincinnati - Milwaukee - Philadelphia

Behind the Scenes with STEEL

Quotes from Washington

■ Everybody should realize by now that our all-out conversion to war production is going to bring about many drastic changes.

Last week one of STEEL's editors returned from Washington with some indications as to what may be in store.

He heard from one top authority: "The rubber situation is desperately critical and within six months many workers in war production plants will be failing to get to work on time because of transportation difficulties . . . . a huge tonnage of rubber is in use in non-essential travel in the Unitetd States and it seems only a question of time when it will become necessary to eliminate this waste."

Another top authority commented: "One of the principal reasons why production is not up to what it ought to be is inefficient management. Yes, a great many managements are outstandingly efficient but a surprisingly large percentage of the total are not. I estimate that if poor managements could be brought up to the level of the really efficient managements we would get a 25 per cent increase in production from that source alone."

A top Army man said: "If only the country would get mad! If people would quit arguing about a 40-hour week and time-and-a-half and double-time pay, the closed shop; if they would quit thinking about whether they will get sugar and tires, how much money they can make out of the war, and really go to work, then we in the fighting forces could go to town."

A top man in the shipbuilding program complained: "Shipbuilding could be pushed to a much higher level; there is a lack of morale, a tendency to slow down on account of union rules as to who should do a job. We need a labor policy which will free workers from all sorts of fears and worries and put them in a frame of mind really to go to work."

A top authority on prices had this to say: "We have a very explosive, inflationary price situation. Consumers this year will have 86 billion dollars to buy goods valued, at present, at 74 billions. Income is increasing 3 per cent a month; the available supply of consumer goods is decreasing 2 per cent a month—and this rate will increase. Wholesale prices have gone up 31 per cent and retail prices since Sept. 1, 1939, and four-fifths of this rise has occurred during the past year. On this showing we are losing the battle of inflation."

Another highly-placed authority said: "Wood and glass now are the only non-scarce materials."

These and many more comments of similar nature all are straws that show which way the wind is blowing.

Name the Job!

■ Some one pointed out the other day that a name-that-fits-the-job well was A. B. Smeltzer, Ass't Fuel Engr. at Wheeling Steel, but we much prefer Roy F. Lab, Met., Barium Stainless Steel Co., Canton, O.

No Mattress?

■ A classified ad in the *Cleveland Plain Dealer* reads: Clean comfortable bed for young man; also room for shop man. Ga. 3286.

Whoever clipped it out and sent it through the inter-office mail had scribbled: We'll sleep on the bed of our turret-lathe!

You Call It

■ You'll have to search far and wide to find anything to compare with the name of the direct-mail piece published regularly by the Modern Collet & Machine Co., Detroit, Mich. It's called (hold your hat): *Wacha-M-Collet!*

Posters Available

■ This week's poster is again available free of charge if you would care to have a supply for your factory and office bulletin boards. Requests for last week's (opposite Page 44, March 30 issue) are piling up on Readers Service, but we're still getting them out promptly. So just send your request along to STEEL, Readers Service Department, Cleveland.

Take a Number From . . .

■ And speaking of Readers Service (which we do quite a lot, thank you), if you've got "PD" problems, let the RSD give you a sample of its efficient service on anything from PD-1-A to 299 or higher. We've got 'em in any quantity you need for quick delivery.

Fuller Brush Men

■ The thrilling news of Commando raids along the French coast reminds us that Commando technique in house to house fighting is to kick open the front door and then duck. This leads us to believe that the English Commandos have adopted the popular brush-vacuum-cleaner-shoe lace-kitchen pan canvassing etiquette so familiar in the United States.

Shave for Bombers

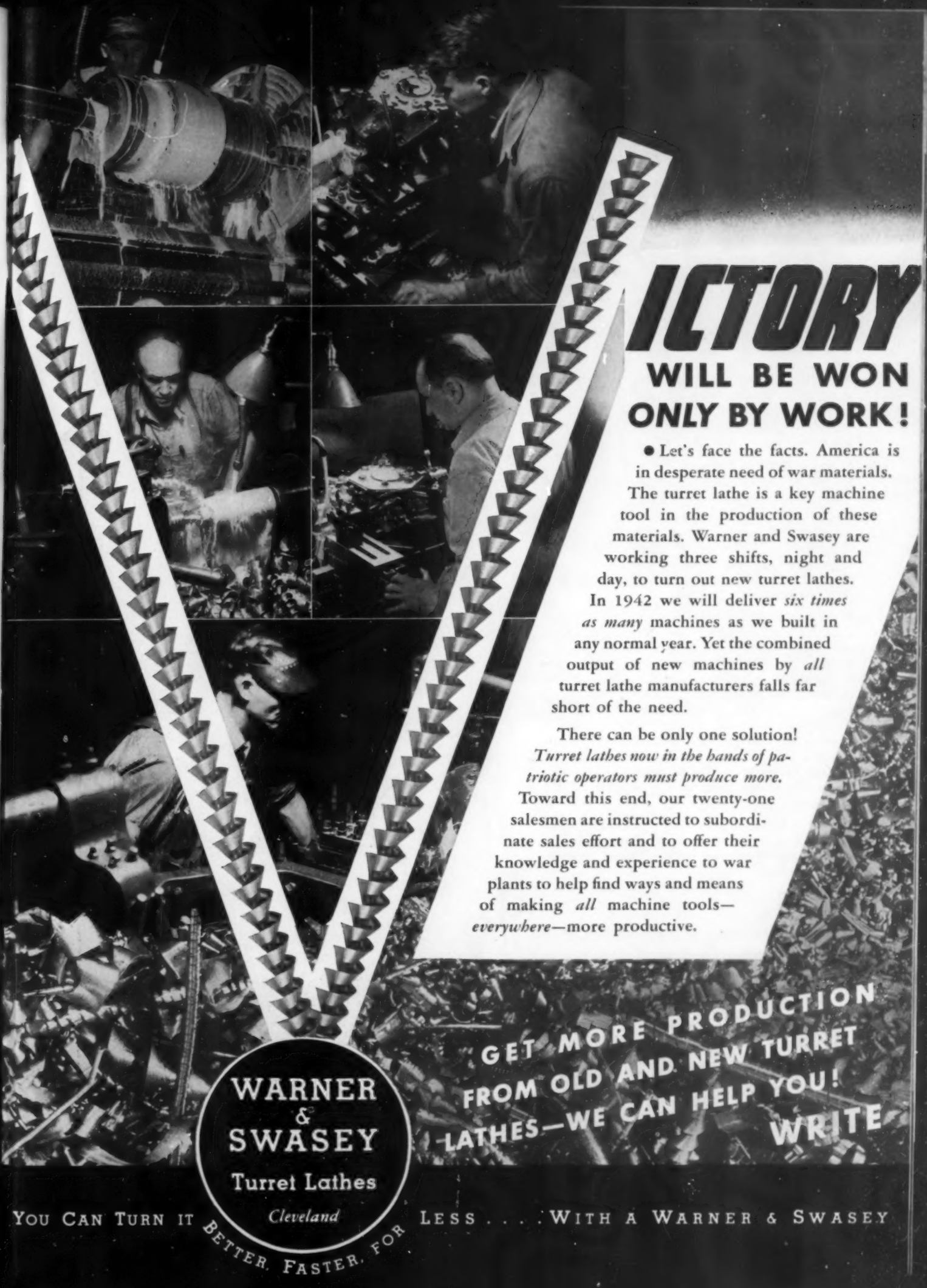
■ And now WPB comes along with Order L-72 to tell us not to shave—at least with not more than one blade a week. This abstinence on the part of the bearded sex, it is estimated, will save annually 1000 tons of special high carbon strip steel and 550 tons of low carbon steel.

We can see the slogans now—"Shink the Japs — Shave with Schick" or "Ax the Axis with an ax—not a razor." OUCH!

But, on the other hand (or other cheek) this will add up to just a few more bombers for Hitler.

Vol. 110, No. 14, April 6, 1942, issue of STEEL, published every Monday at Cleveland, O. Entered as second class matter at the postoffice, Cleveland, O., under act of March 3, 1879. U. S. and possessions, Canada, Mexico, Cuba, Central and South America, 1 year $6; 2 years $10; all other countries, 1 year $12. Current issues, 25c. Yearbook of Industry issue, $2.00.

Buy a Defense Bond—Today!


ICTORY
WILL BE WON
ONLY BY WORK!
● Let's face the facts. America is in desperate need of war materials. The turret lathe is a key machine tool in the production of these materials. Warner and Swasey are working three shifts, night and day, to turn out new turret lathes. In 1942 we will deliver *six times as many* machines as we built in any normal year. Yet the combined output of new machines by *all* turret lathe manufacturers falls far short of the need.
There can be only one solution! *Turret lathes now in the hands of patriotic operators must produce more.* Toward this end, our twenty-one salesmen are instructed to subordinate sales effort and to offer their knowledge and experience to war plants to help find ways and means of making *all* machine tools—*everywhere*—more productive.
GET MORE PRODUCTION FROM OLD AND NEW TURRET LATHES—WE CAN HELP YOU! WRITE
WARNER & SWASEY
Turret Lathes
Cleveland
YOU CAN TURN IT BETTER, FASTER, FOR LESS . . . WITH A WARNER & SWASEY

NATCO

B-5B Multi-Driller

for Heavy Work

• This NATCO may be arranged with a large head having a 24″ x 50″ rectangular drilling area, with either twenty-six 3″ diameter adjustable joint drives or thirty-six 2½″ diameter adjustable joint drives. This huge NATCO is provided with an adjustable hydraulic feed, and machine may be operated with very little effort through the push button station located on the right hand corner of the machine base.

• Natco machines of this type are of exceptionally heavy construction and are particularly adapted to the multiple drilling of heavy work.

• These machines are modern in every respect, and reflect in their construction more than 40 years of experience in building Adjustable Multi-Spindle Drilling, Boring and Tapping Machines. They will handle a wide range of heavy work at an absolute minimum of cost.

• These NATCO Holesteel General Purpose Drillers are built with a variety of head sizes, and with a wide range of capacities of standardized machine elements which may be arranged in various combinations. Should the user want to change these machines for other types of work, it is only necessary to rearrange the machine elements and completely change the machine from one type to another. For example, an Adjustable Multi-Spindle machine may be changed to a Single-Spindle or a Fixed Center Multi-Spindle Driller by removing one head and mounting another suitable for the new work.

• Send in prints of your work . . . NATCO Engineers will gladly assist you in reaching a practical and economical solution to your "Hole" problem.

NATIONAL AUTOMATIC TOOL COMPANY, INC.
Richmond, Indiana, U. S. A.

Chicago Office: 1809 Engineering Bldg., Wacker Drive at Wells
Detroit Office: 409 New Center Building

Write for Circular Number 520

Investigate NATCO Methods for the Lowest Possible Hole Costs!

NATCO
DRILLING, BORING and TAPPING MACHINES
SOLVES YOUR "HOLE" PROBLEM

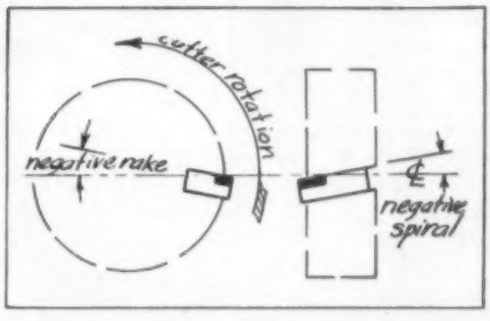
Now IT CAN BE DONE!

FIRTHITE **Negative Rake** Face Mills speed the milling of parts for all calibers and types of both naval and artillery cannon.

Hyper-speed FIRTHITE Mills multiply armament production of all high-strength alloy-steel equipment vital to our War Effort.

These cutters are operated up to TEN times the speed and SIX times the feed of high-speed steel mills.

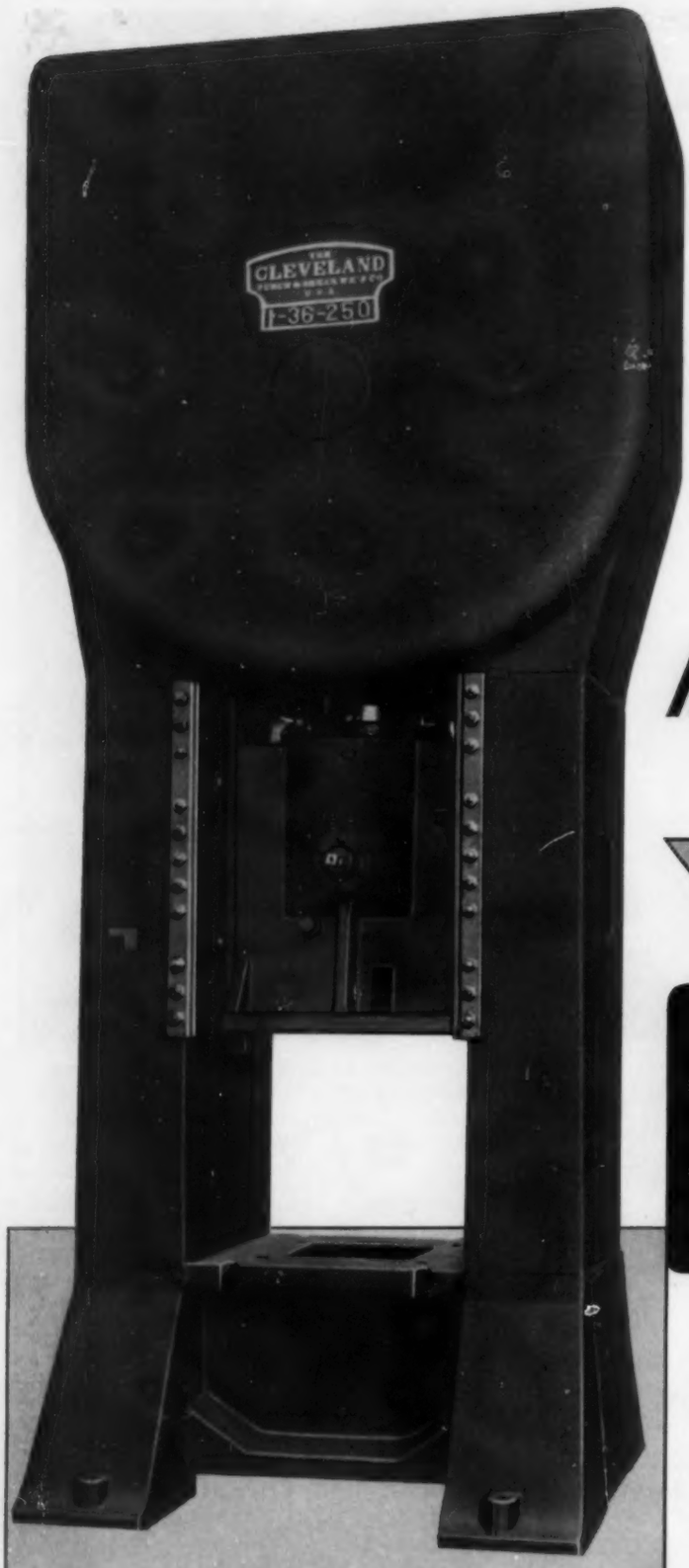
Complete face mills of this type are made by the OK TOOL COMPANY, INC.



Design of FIRTHITE-tipped face mill for steel. Note: Both **rake** and **spiral** angles are NEGATIVE!

FIRTH-STERLING STEEL COMPANY

OFFICES:
McKEESPORT, PA.
NEW YORK CHICAGO
HARTFORD PHILADELPHIA
LOS ANGELES DAYTON
CLEVELAND DETROIT



MODERN DESIGN makes this Difference

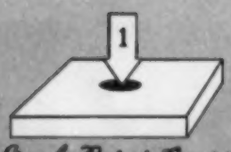
20% OR MORE SAVED ON FLOOR SPACE

The arrangement of the gears, flywheel and drive unit in the box type crown not only eliminates all overhanging gears, brackets and other projections but also saves 20% or more of very valuable floor space.

This is true whether the Press is a Modern Single Point, Two Point or Four Point, as each is designed along similar lines.

Furthermore, each of these types can be furnished in sizes and capacities to suit particular requirements and with electrically controlled, hydraulically or pneumatically operated, friction clutch and brake.

The Single Point illustrated has a capacity of 250 tons, a bed area 42" x 36", stroke 12", and operates at 30 strokes per minute.



Single Point Press

THE CLEVELAND PUNCH & SHEAR WORKS COMPANY · · *Cleveland, O.*

★ Let this Service Help You ★

Speed up Production

of Metals and Metal Products

BELOW is a partial list of the ferro-alloys and alloying metals that we produce. Some of these are strategic materials. All of them are important ingredients for making iron, steel, and certain non-ferrous metals.

During our more than 35 year's experience in the production and use of these alloying materials, we have developed a vast fund of information about the production, fabrication, and use of iron, steel, and other metals. This reservoir of metallurgical data is available to you who work with metals to help you do your jobs in the simplest and quickest way.

This service is given practical effect by a staff of trained metallurgists who can give you on-the-job assistance. In addition, our extensive laboratory facilities are available for solving your special problems.

Perhaps, for instance, you are having difficulty getting certain alloys these days. Then let us suggest how you might use available materials and still maintain the quality of your product.

Nothing should interfere with speed and more speed in metalworking production today. Toward this end, ask us for whatever help we can give you, without obligation.

ELECTRO METALLURGICAL COMPANY

Unit of Union Carbide and Carbon Corporation

UCC

30 East 42nd Street, New York, N. Y.

"Electromet" Ferro-Alloys and Metals are available through offices of Electro Metallurgical Sales Corporation in Birmingham, Chicago, Cleveland, Detroit, New York, Pittsburgh, and San Francisco. In Canada: Electro Metallurgical Company of Canada, Limited, Welland, Ontario.

Electromet

TRADE-MARK

Ferro-Alloys & Metals

CHROMIUM
Low-Carbon Ferrochrome (in grades, maximum 0.06% to maximum 2.00% carbon)
High-Carbon Ferrochrome (maximum 6.00% carbon)
High-Nitrogen Ferrochrome
Chromium Metal
Chromium-Copper
"CMSZ" Alloy
Miscellaneous Chromium Alloys

•

TUNGSTEN
Ferrotungsten
Tungsten Powder

SILICON
Ferrosilicon 50%
Ferrosilicon 75%
Ferrosilicon 80 to 90%
Ferrosilicon 90 to 95%
Silicon Metal
"Silvaz" Alloy
"SMZ" Alloy
Miscellaneous Silicon Alloys

•

ZIRCONIUM
Zirconium 12 to 15%
Zirconium 35 to 40%
Aluminum-Zirconium

MANGANESE
Standard Ferromanganese 78 to 82%
Low-Carbon Ferromanganese
Medium-Carbon Ferromanganese
Manganese Metal
Miscellaneous Manganese Alloys

•

"EM" BRIQUETS
(Patented)
Silicon Briquets
Manganese Briquets
Chromium Briquets

CALCIUM
Calcium-Silicon
Calcium-Aluminum-Silicon
Calcium-Manganese-Silicon
Calcium Metal

•

SILICO-MANGANESE
Maximum 1.50% and 2.50% Carbon

•

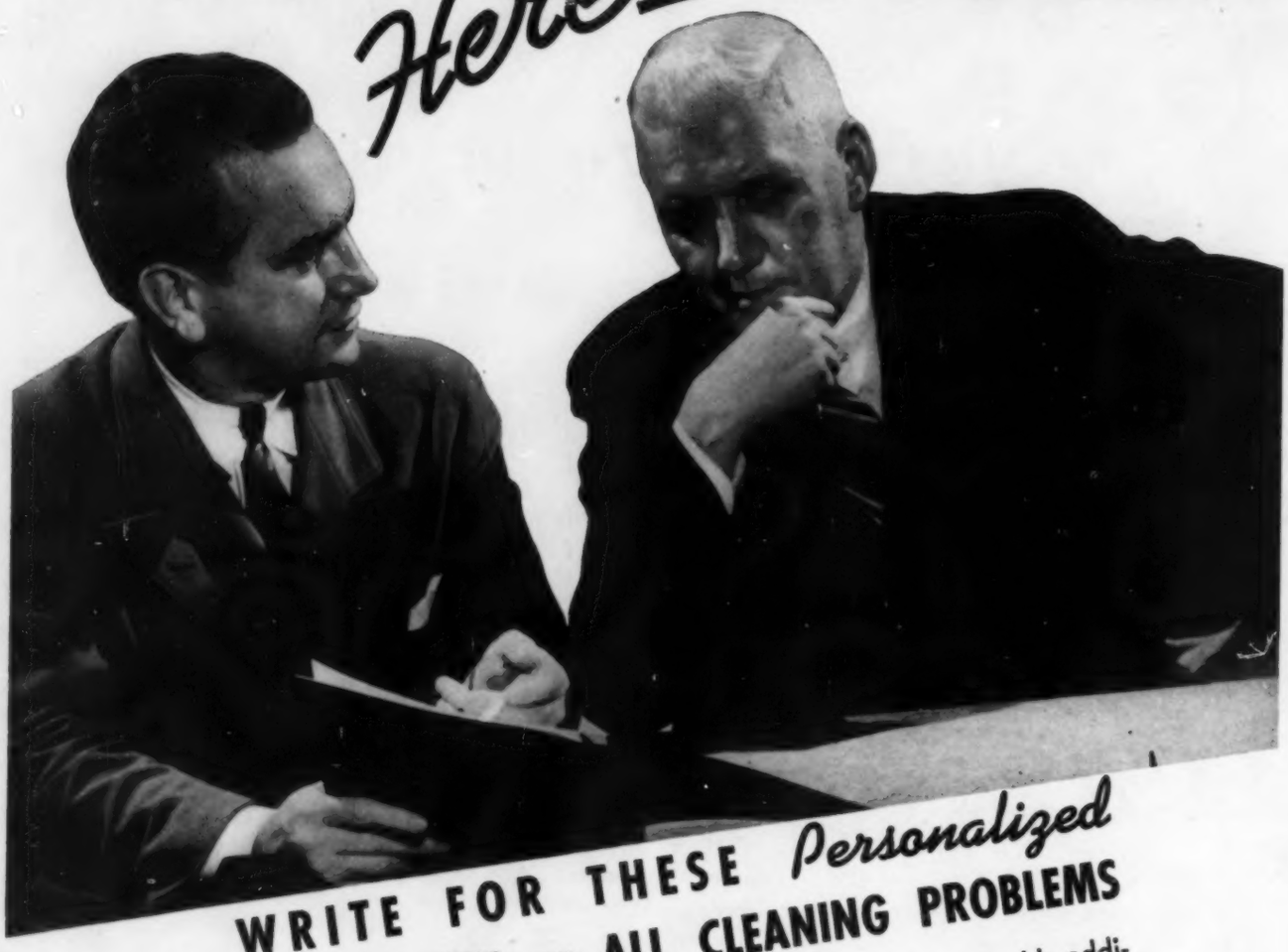
VANADIUM
All grades

•

COLUMBIUM
Ferrocolumbium

The words "Electromet" and "Silvaz" and the letters "EM", "SMZ", and "CMSZ" are trade-marks of Electro Metallurgical Company.

. . . AND *Here's* THE ANSWER



WRITE FOR THESE *Personalized* DATA SHEETS on ALL CLEANING PROBLEMS

In times like these manufacturers cannot afford to take chances! In addition to MacDermid's tried and proven processes and chemicals for all basic problems on cleaning ferrous and non-ferrous metals there are now available special data sheets containing improved and doubly effective chemicals and processes for speeding up all cleaning operations of basis metals needed for defense.

Write today and state your particular problems or phone one of MacDermid's branch offices and have a qualified MacDermid representative assist you with your problems. . . . Be sure and learn about the NEW ANODEX electrolytic polishing action for chemically and metallurgically cleaning ferrous metals.

Special Processes and Compounds for Cleaning Basis Metals.

SALES AND SERVICE
from
COAST TO COAST
New York . . . Cleveland . . .
Los Angeles . . . Chicago . . .
Newark . . . Detroit . . . St. Louis
Philadelphia . . . Toronto, Can.

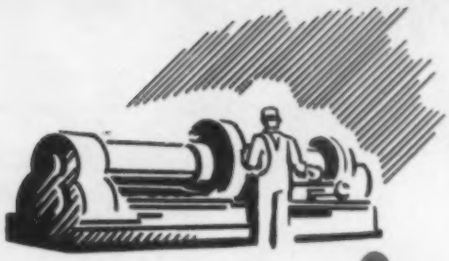
MANUFACTURED SOLELY BY

MACDERMID

INCORPORATED

WATERBURY • CONNECTICUT

Improve Machinability of FORGINGS!



SPEED VICTORY WITH

HAGAN

ANNEALING FURNACES

Your forgings will machine better ... faster ... at lower cost when annealed or normalized in a Hagan Furnace. Hagan Furnaces provide all of the advantages of high efficiency, controlled heat-zoning, economy and speed adapted to continuous operation. "Hair-trigger" heat control permits you to anneal, normalize, stress-relieve, control grain-size or spheroidize with assured accuracy, speed and economy.

Typical of the uses and acceptance of Hagan Annealing Furnaces is the partial list of war materials shown below, all of which are now being successfully treated in Hagan Furnaces by leading prime contractors and subcontractors.

If you are producing for war or essential industries let Hagan solve your annealing and heat-treating problems. Our engineers will gladly develop unbiased recommendations on your requirements without obligation. Deliveries are exceptionally prompt for all vital applications.

TYPICAL PRODUCTS BEING TREATED IN HAGAN FURNACES

Aircraft Crankcases . . Connecting Rods Propellers . Hub Spiders . Steering Knuckles Cam Shafts . Steering Arms . Crankshafts Gun Carriage Parts . . Landing Gear Parts and other miscellaneous parts.

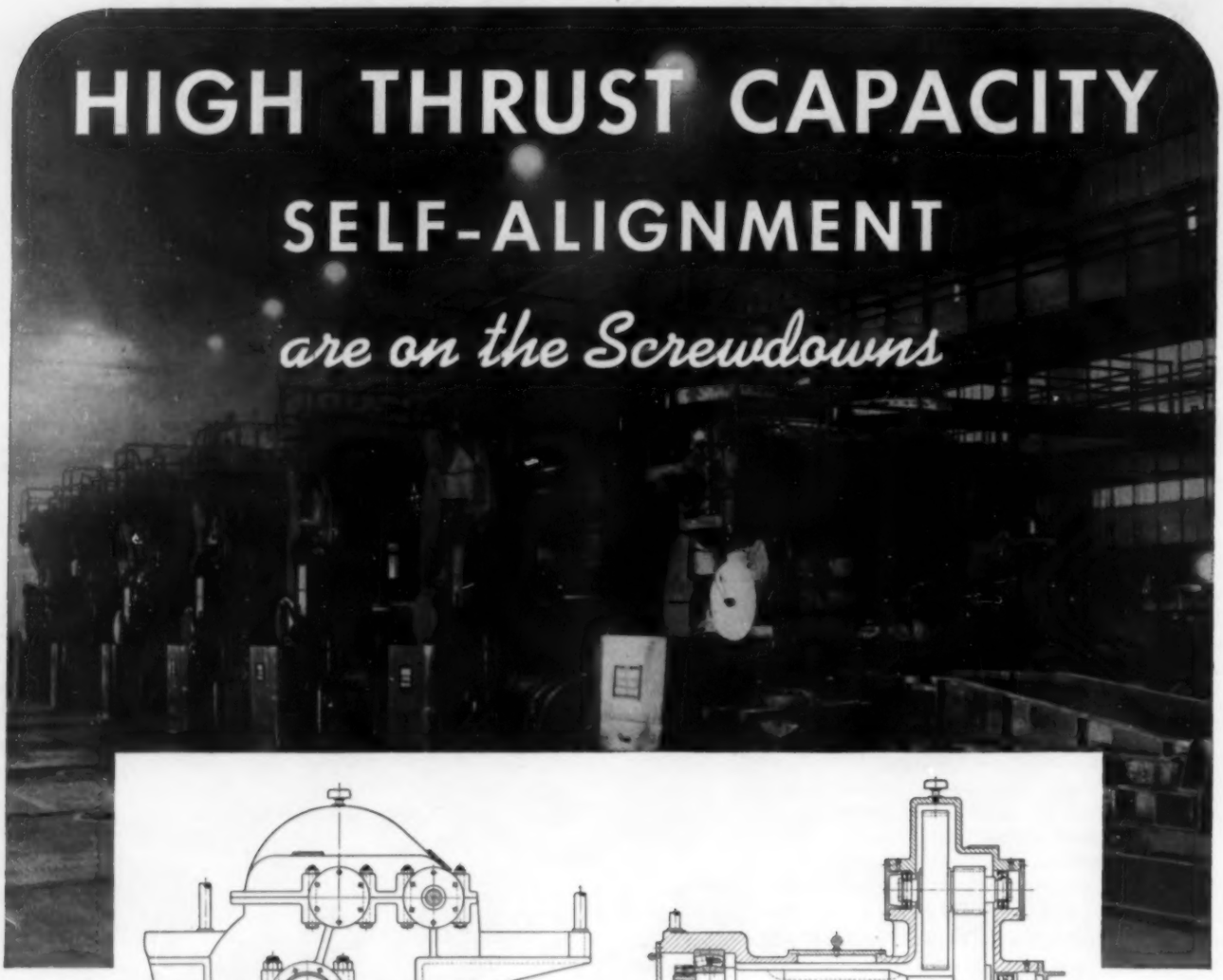
MAKERS OF HIGH EFFICIENCY HEATING FURNACES FOR EVERY INDUSTRIAL APPLICATION INCLUDING ANNEALING, FORGING, CARBURIZING, HARDENING, DRAWING AND NUMEROUS OTHER SPECIFIC USES.

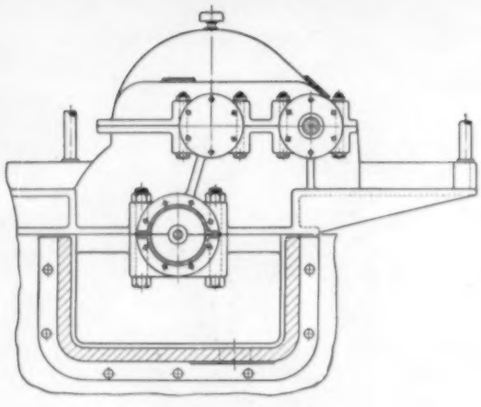
GEORGE J. HAGAN CO.

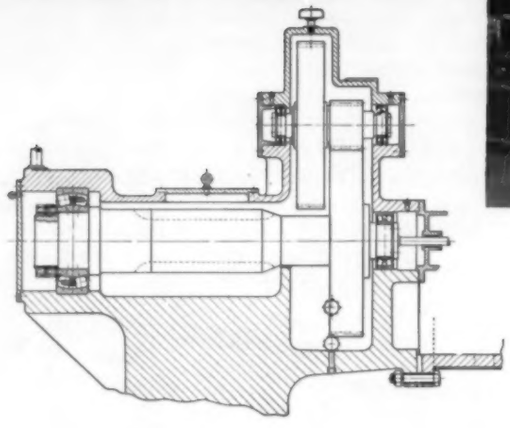
PITTSBURGH, PA.

DETROIT . . . CHICAGO . . . LOS ANGELES . . . SAN FRANCISCO

HIGH THRUST CAPACITY
SELF-ALIGNMENT
are on the Screwdowns





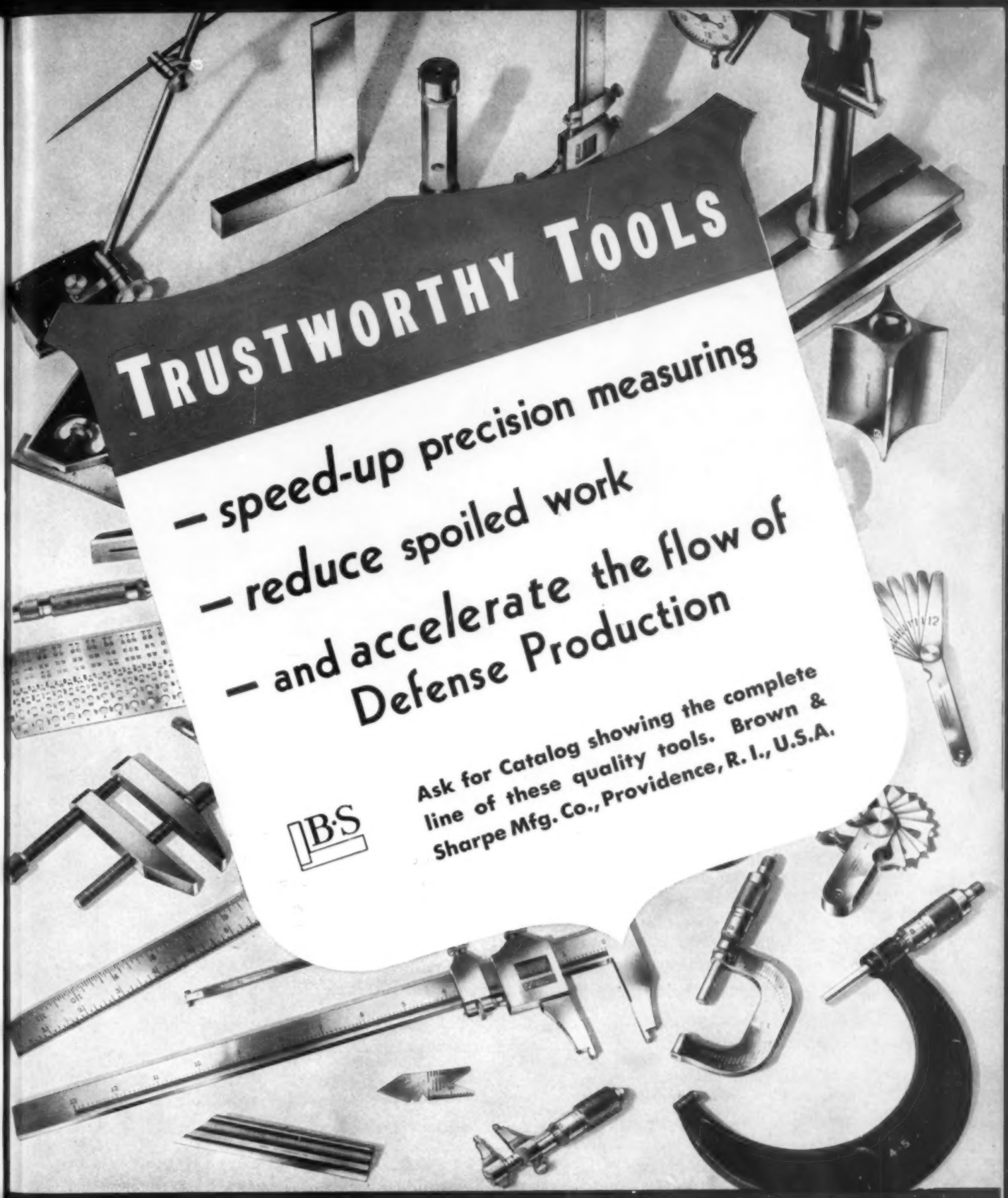


HIGH thrust loads are imposed by these screwdowns on SKF Spherical Roller Bearings. They run over a hundred thousand pounds, but SKF's have been taking them for years. You see, the rolling alignment of SKF Bearings gives *high capacity* for overloads without binding . : . insures *accurate alignment*. Furthermore, SKF's are *practical* because their O.D.'s are relatively smaller than other types that might be used.

That means something where Production is the yardstick by which a machine is measured. SKF Industries, Inc., Front St. & Erie Ave., Philadelphia, Pa.

5024

BALL BEARINGS **SKF** ROLLER BEARINGS


TRUSTWORTHY TOOLS
– speed-up precision measuring
– reduce spoiled work
– and accelerate the flow of Defense Production
B·S
Ask for Catalog showing the complete line of these quality tools. Brown & Sharpe Mfg. Co., Providence, R. I., U.S.A.

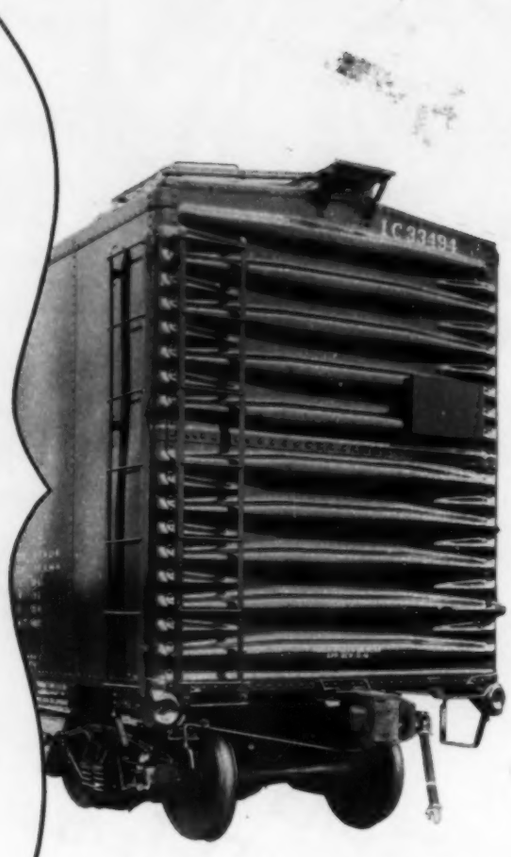
BROWN & SHARPE TOOLS

DREADNAUGHT CAR ENDS

made of

N-A-X High Tensile

...INCREASE PAYLOADS, HAVE GREATER RESISTANCE TO IMPACT AND FATIGUE



Every time a freight car is fabricated of N-A-X HIGH TENSILE, it means not only that the railroad is slicing deadweight and increasing the payload of each car, but that more steel can be diverted to the armed forces of our country.

DUCTILITY
ITS INHERENTLY FINER GRAIN MAKES ALL THE DIFFERENCE
IN STRENGTH

It is an established fact that it takes fewer tons of steel to produce a car of a given strength factor with N-A-X HIGH TENSILE than with mild carbon steel. With a car weighing less, it takes less power to pull it, fully loaded or empty. Then, too, because of the inherent qualities of this superior low alloy steel, cars will give longer service, have greater resistance to STRESSES, SHOCKS, IMPACT and FATIGUE, regardless of weather conditions.

N-A-X HIGH TENSILE is easy to fabricate. It goes through each step in the shop smoothly, quickly. Its welding characteristics are excellent, responding equally well to all types. And because it is highly ductile, it can be cold formed with the ease and speed of mild carbon steel.

N-A-X HIGH TENSILE has other important properties, too. They are high yield point, high ultimate strength and greatly increased resistance to abrasion and corrosion.

For additional information about N-A-X HIGH TENSILE, ask for a Great Lakes engineer to call. Write, wire or telephone for one today. No obligation.

Send for Booklet on our N-A-X 9100 Series—the Versatile Steel

LIST OF PRODUCTS

Hot Rolled Strip (down to 1 inch wide) . . . Hot Rolled Strip Sheets (up to 91 inches wide) . . . Spring Steel (carbon and alloy) . . . Merchant Bars . . . Forging Bars . . . Automobile Bumper Sections . . . Bar Mill Sections . . . N-A-X HIGH TENSILE Bars, Shapes, Sheets, Billets . . . Sheet Bars . . . Hot and Cold Rolled Sheets . . . Michigan Metal for Vitreous Enameling . . . Deep Drawing Quality (in all grades, widths up to 91 ins.) . . . Stran-Steel Metal Framing for Residential and Commercial Construction.

GREAT LAKES STEEL CORPORATION—DETROIT, MICHIGAN

Sales Offices in Principal Cities

division of NATIONAL STEEL

NATIONAL STEEL CORPORATION

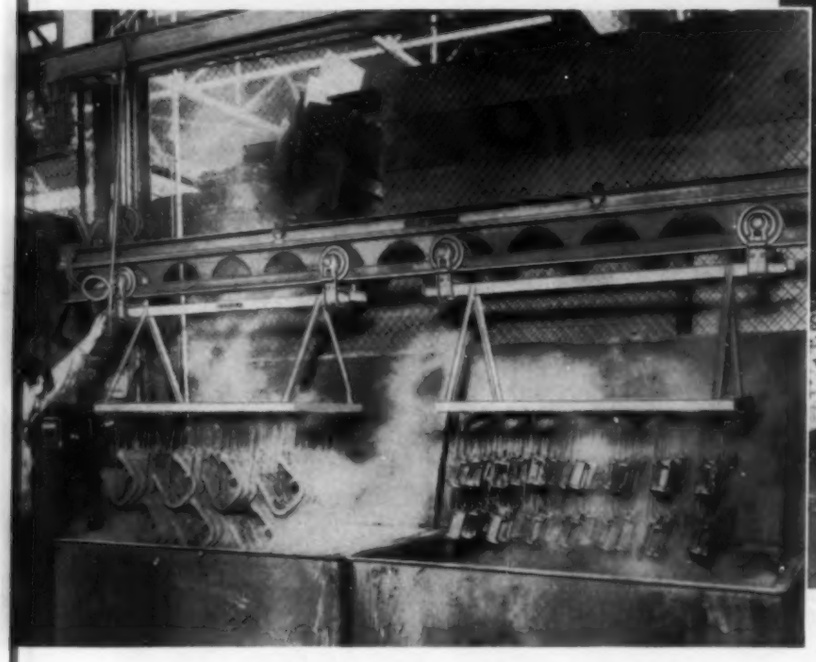
Executive Offices, Pittsburgh, Pa.

DROP SECTIONS . . .

for

DIPPING
CLEANING
PAINTING
PLATING

•



ACCELERATE PRODUCTION by eliminating hand-handling

Mass-production methods are made possible in the dipping, cleaning, painting and plating of parts by the use of Cleveland Tramrail Drop Sections.

Racks loaded with parts can be passed through a sequence of operations such as cleaning, drying, dip painting, dripping, baking, etc., without ever being touched by hand or removed from the Tramrail system. The carriers with loaded racks are easily conveyed to the drop sections installed over the various tanks. The sections lower the parts into the solutions and elevate them to the original level, permitting the carriers to roll on to the next point.

Many companies are eliminating hand-handling, accelerating production and lowering costs with drop sections.

BOOKLET No. 2008 . . Packed with valuable information. Profusely illustrated. Write for free copy on your company letterhead.

GET THIS BOOK!

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
1125 EAST 283RD ST. WICKLIFFE, OHIO.

MANUFACTURERS OF • CLEVELAND CRANES • CLEVELAND TRAMRAIL • STEELWELD BENDING PRESSES

CLEVELAND TRAMRAIL

OVERHEAD MATERIALS HANDLING EQUIPMENT

MUSIC WIRE

BY

WASHBURN

Washburn wire makers are skilled craftsmen who have been schooled by long experience in the highest standards of quality workmanship. Talent and the most up-to-date equipment produce clean, uniform wire . . . straight throughout the coil, and held to close tolerances in all physical requirements.

The operations of making Eagle Music Wire are exercised with extreme care. To maintain a bright, clean surface, the finished wire is handled with gloves to prevent perspiration marks which lead to rust and finally to surface pitting.

Specify Eagle Music Wire for superlative quality.

WASHBURN WIRE COMPANY, NEW YORK CITY

WASHBURN

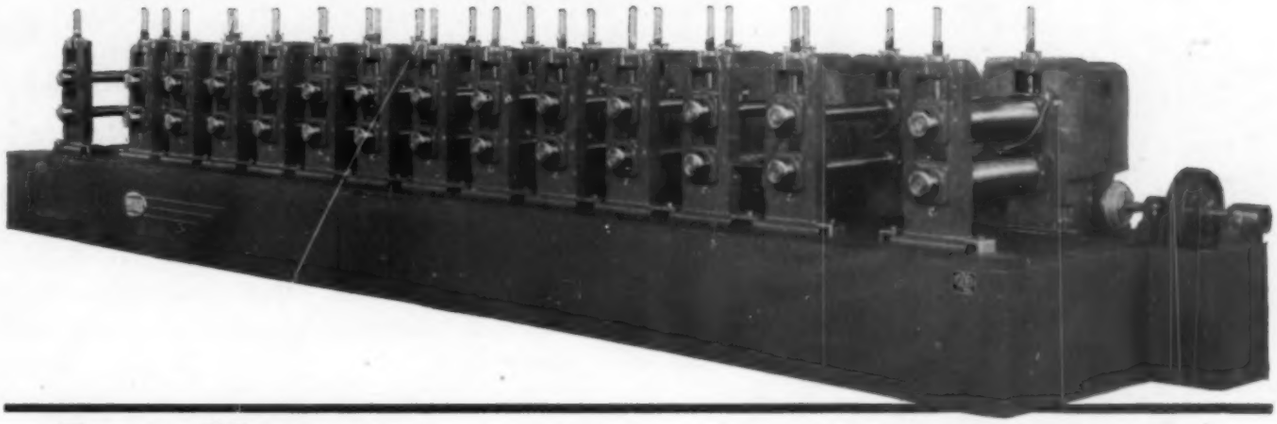
CLEAN UNIFORM BILLETS - STRIP - RECTANGULAR, ROUND, FLAT RODS
TEMPERED AND UNTEMPERED FLAT AND ROUND HIGH CARBON WIRES

ATTENTION AVIATION

NEW HIGH SPEED PRODUCTION BY . .

ENGINEERING YODER MANUFACTURING

ROLL FORMING EQUIPMENT



IT'S NEW, YODER ROLL FORMING EQUIPMENT

Yoder "KNOW HOW"

IS NO ACCIDENT!

• FIRST in the field, over thirty years ago, they have developed and patented fundamental features of *Roll Forming Equipment.*

Naturally, this pioneer type of mentality is not content to "rest on it's laurels," but must push progressively onward.

The Yoder Company's thinking, planned research and daily effort devoted exclusively and focused expertly on this all-important and absorbingly interesting subject to them, has culminated in *an Improved Method of Forming Aluminum Alloy.*

THE RESULTS, as substantiated by laboratory tests are — *(1)* Aluminum Alloys formed without rupturing the internal structure. *(2)* A work hardening condition that adds strength.

You get the improvement FIRST from Yoder's.

YODER MANUFACTURING

SPECIAL PRODUCTION MACHINERY

COMPLETE TUBE MILLS • BORING MILLS • BEADING MACHINES
BENDING MACHINES • BRAKE SHOE MACHINES • TENSION REELS
COILERS • UNCOILERS • ROLL-FORMING MACHINES • FLYING CUT-OFF MACHINES • SLITTING LINES • SCRAP CUTTERS • POWER HAMMERS

designed for the special purpose of forming the following alloys . . .

(1) 24SO (2) 24ST (3) 24SRT

A factual booklet has been prepared and can be obtained by responsible persons as long as the very limited supply lasts.

THE YODER COMPANY

5508 Walworth Ave.
CLEVELAND, OHIO

TITLE _____
NAME _____
COMPANY _____
STREET _____
CITY _____ STATE _____

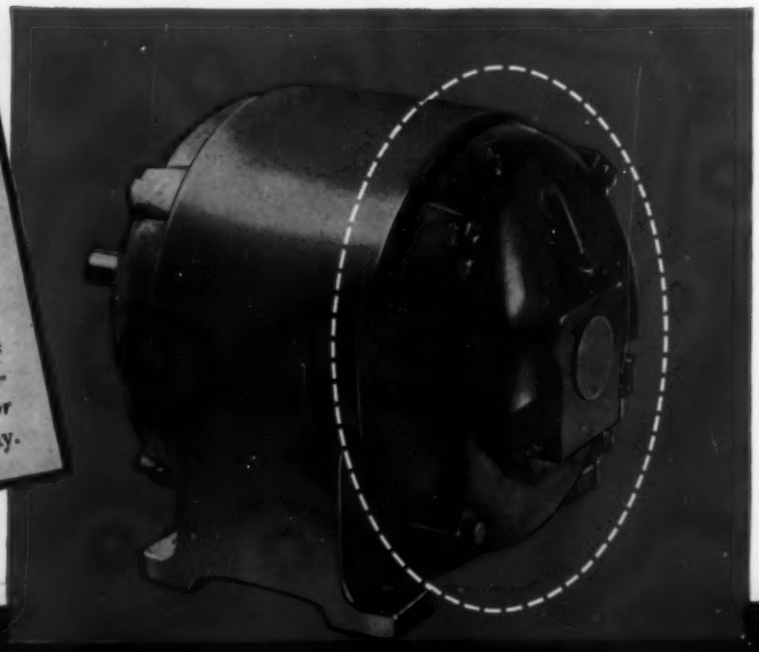
LOOK at the BEFORE YOU BUY!

Allis-Chalmers New Lo-Maintenance Motor With "Safety-Circle" Protection Gives You All-Around Protection . . . More Dependable Power For Your War Production Needs!

IT'S NEW . . . it's different . . . it's ready NOW when it's needed most! Allis-Chalmers NEW Lo-Maintenance Motor with "Safety-Circle" protection gives you all-around enclosure of vital parts!*

Other motors may be "protected," but just compare them with "Safety-Circle" protection — complete, all-around protection that extends underneath as well. To foremen, superintendents and maintenance men this means more service and

SEE HOW
"Safety Circle"
GIVES YOU
PROTECTED ENCLOSURE
OF ALL VITAL PARTS
Look at the "broken-circle" design of other motors with exposed undercarriage and incomplete protection. Compare this to "Safety-Circle" construction that guarantees *all-around protection* of vital parts.
Acting as an anchored shock absorber, it gives the entire structure of the motor and all its parts high resistance to blows, knocks, falling objects — keeps your motor in factory-fresh condition for its entire life under normal operating conditions.
To foremen, superintendents, and maintenance men it means more service and smoother operation with less maintenance and lower costs—*more motor for your money* in the Allis-Chalmers way.



ALLIS-CHALMERS LO-MAINTENANCE

BOTTOM

smoother operation with less maintenance and lower costs — more motor for your money in the Allis-Chalmers way!

The "Safety-Circle" is a wide, integrally cast rib that forms an unbroken circle of protection around the stator chamber . . . acts as an anchored shock absorber . . . gives the entire structure of the motor and all its parts high resistance to blows, knocks, falling objects.

In covering the bottom of the motor, the "Safety-Circle" keeps out dust and dirt and foreign particles that cause abrasive wear and tear to a motor . . . yet it permits complete ventilation of all interior parts.

From frame to shaft . . . from bearing to bearing the NEW Lo-Maintenance Motor is loaded with dependable power, extra performance to meet today's heavy production schedules. Available in ball-bearing or sleeve-bearing types.

Get the complete story! Write Allis-Chalmers, Milwaukee, Wisconsin, for Bulletin No. B-6210. Or call the engineer in the district office near you. A 1498

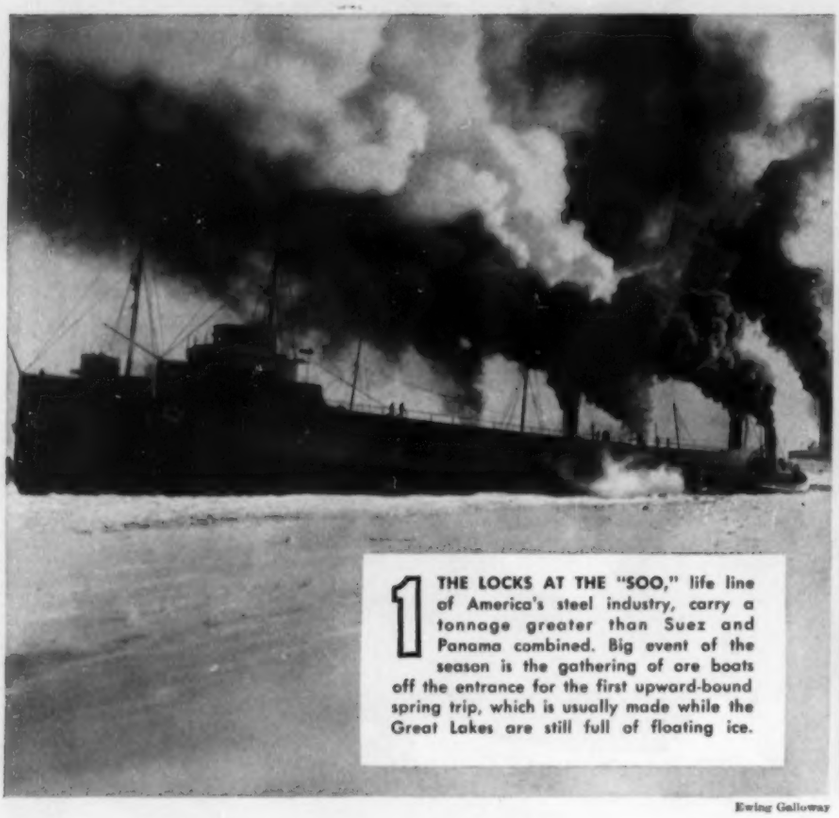
**Don't confuse this NEW motor with higher-priced motors for so-called special purposes. All the extra advantages of this standard motor are yours at no extra cost!*

Extra Protection
IN EVERY PART, TOO!

- Increased cross-strength and inter-phase insulation improves efficiency of distortionless stator.
- Indestructible rotor keyed to shaft, turned to assure accurate, uniform air-gap.
- Improved ball-bearing and sleeve-bearing designs have efficient lubrication features for longer life.
- Oil drains at bottom of bearing for easy flushing, faster maintenance.

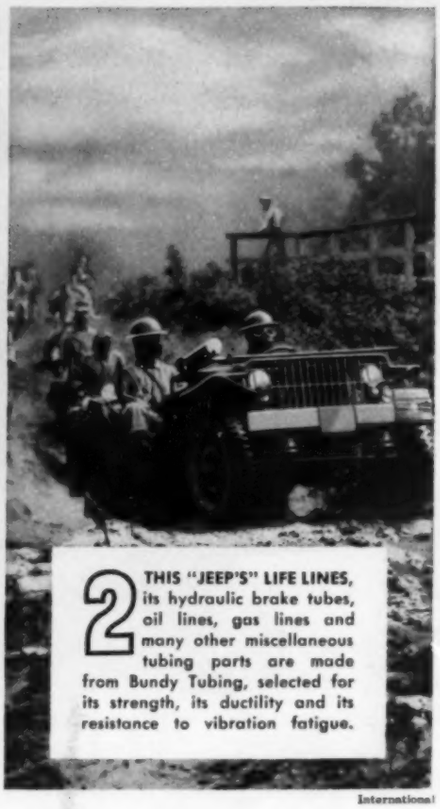
MOTOR WITH *"Safety Circle"* PROTECTION

FAMOUS LIFE LINES



1 THE LOCKS AT THE "SOO," life line of America's steel industry, carry a tonnage greater than Suez and Panama combined. Big event of the season is the gathering of ore boats off the entrance for the first upward-bound spring trip, which is usually made while the Great Lakes are still full of floating ice.

Ewing Galloway



2 THIS "JEEP'S" LIFE LINES, its hydraulic brake tubes, oil lines, gas lines and many other miscellaneous tubing parts are made from Bundy Tubing, selected for its strength, its ductility and its resistance to vibration fatigue.

International

WHEREVER fuel or lubricants must be carried, wherever vacuums are necessary or hydraulic pressure must be transmitted, Bundy Tubing has long been standard for its strength, its ductility and its resistance to vibration fatigue. So it's not surprising that more than forty types of military automotive vehicles for the United States and its allies use Bundy Tubing for twenty-six basic applications.

Tanks and marine engines, tractor cranes and tandem rollers, radios and radio antennas, ground and parachute flares and expeditionary gasoline cans, welding machines and cartridge loaders, aircraft engines and propellers, battery chargers and searchlight units —these are other random examples of military equipment using Bundy Tubing.

In the equally essential field of non-military defense items, Bundy Tubing plays just as important a part. Farm machinery and tractors, poultry brooders and incubators, excavating and road-building machinery, machine tools and welding machines, coal mining and oil drilling equipment, fire engines and utility maintenance equipment, oil burners and bottled gas — all use one or another type of Bundy Tubing.

If you use tubing in or near Bundy's range of sizes, you should have complete information on the Bundy line. Bundy Tubing Company, Detroit, Michigan.

BUNDY TUBING

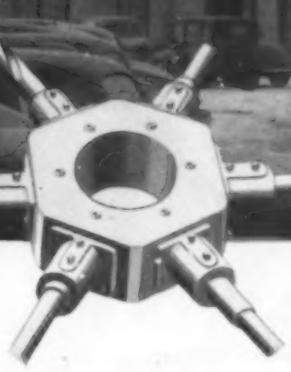
ENGINEERED TO YOUR EXPECTATIONS

BUNDYWELD double-walled steel tubing, hydrogen-brazed, copper-coated inside and outside. From Capillary sizes up to and including $\frac{1}{4}$" O. D. This double-walled type is also available in steel, tin-coated on the outside, and in Monel.

BUNDY ELECTRICWELD steel tubing. Single-walled — butt welded — annealed. Also furnished tin-coated outside if desired. Available in sizes up to and including $\frac{5}{8}$" O. D.

BUNDY "TRIPLE-PURPOSE" MONEL tubing. Double-walled, rolled from two strips, joints opposite, welded into a solid wall. Available in all Monel, Monel inside —steel outside, and Monel outside —steel inside. Sizes up to and including $\frac{5}{8}$" O. D.

28 Days Make a Difference!

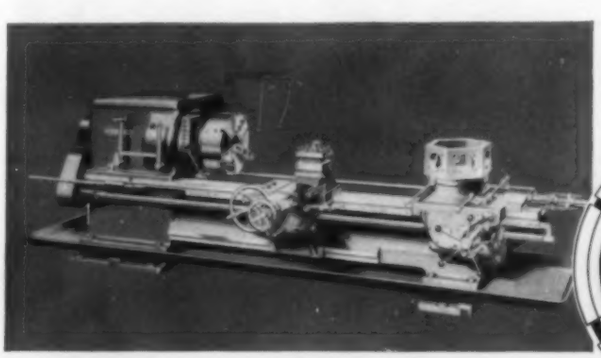


A NEW PLANT · A NEW MACHINE TO SPEED VICTORY

Just 28 days elapsed between the taking of these two photographs—from ground-breaking to new structure for the 50,000 square foot addition to the Gisholt Machine Company's Northern Works.

Days, hours, even minutes count now!

Rushed to completion in record time, this new addition to the Gisholt plant will provide facilities for a new department to be devoted exclusively to the manufacture of large turret lathes in two sizes. Even as you read this, we will be beginning to produce these machines in very large quantities to meet the urgent demands for more machine tools. Watch for a later announcement with regard to delivery dates. Gisholt Machine Company, 1217 Washington Avenue, Madison, Wisconsin.



THE NEW TURRET LATHES—to be known as the 3-R and 4-R, are modifications of the Gisholt 3-L and 4-L Heavy Duty Turret Lathes. (5¼″ and 9¼″ spindle bores; 21″ and 24″ chucks; 28½″ and 31″ swings.) Essential industries requiring machines of these sizes should place their names on our list *now* to receive literature when ready.

GISHOLT

Look Ahead—Keep Ahead—With Gisholt Improvements in Metal Turning

TURRET LATHES · AUTOMATIC LATHES · BALANCING MACHINES

WHEN THE
"MASK"
COMES OFF
More and more steel companies are using Ferro-Carbon Titanium as the final deoxidizer and cleanser of rimming steel. The reasons? First: after the molds are "stripped", they find that ingots are thick skinned with little or no sub-surface porosity. Second: Titanium-treated steel is clean steel... free from oxide inclusion and slag. Write for specific data on the use of Titanium in steel.
TITANIUM
ALLOY MANUFACTURING CO.
T.A.M.
ZIRCONIUM TITANIUM
PRODUCTS
Registered U. S. Pat. Off.

GENERAL OFFICES AND WORKS: NIAGARA FALLS, N. Y., U. S. A.
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Representatives for Europe . . . . . T. Rowlands & Co., Ltd., 23-27 Broomhall St., Sheffield, England

THE RANKING FILE
in the Army of War-Production
SIMONDS RED TANG

Regiments of Red Tang Files are helping to build and maintain ships, planes, tanks and military bases. For every Red Tang File leaves the Simonds controlled-conditions plant in top physical condition to meet today's demand for non-stop service and the finest grade of work with least effort. Simonds has never made any but this one quality of file . . . *the finest by a mile.*

To get the full ease and speed of cutting and the extra service which Simonds puts into every Red Tang File, mechanics and their helpers are invited to write for the helpful new 48-page book: "Facts for Mechanics", which gives quick facts on the correct care and proper use of files.

SIMONDS

FAMOUS FAMILY OF METAL-CUTTING TOOLS

CIRCULAR & BAND SAWS • SHEAR BLADES • RED END HACK SAWS • RED TANG FILES • TOOL BITS

"CALL TO SICK-BAY"

but not a man answered!

Wind screaming through the rigging! Dark, ominous storm clouds piling up in the northeast! And the captain bellowing, "Shorten sail . . . batten down all hatches!".

That was bad news for the bluejackets aboard early American warships. It meant berth decks sealed tight against ventilation—unbearably stuffy—damp, foul-smelling. A breeding place for disease. It meant a sick-bay crowded with stricken sailors.

But American skill and resourcefulness came up with the answer—a ventilating system for warships! The first mechanical ventilating system for warships, installed in 1879 on the famous U.S.S. Richmond, proved an immediate success. In the words of Chief Engineer King of the U. S. Navy, as quoted in the Army and Navy Journal of March 8, 1879: *"After consultation with Mr. B. F. Sturtevant, who has had large experience in ventilating buildings, a contract was made to design and build two exhausting fans."*

And, continues Chief Engineer King, in describing the results of this ventilating system: *"There is no smell of bilge water and no impure air on the berth deck. The officers and crew of this ship enjoy pure air at all times. It is the most healthful, completely ventilated ship that ever sailed under the American flag —or any other flag."*

Today, Sturtevant Ventilating and other Air Handling Equipment is still "In the Navy"... on a large majority of America's fighting ships, old and new—ships ranging from battleships to mine-sweepers—from aircraft carriers to sub-

Sturtevant

Puts Air to Work

for

War Production

Conserving Metal for Planes—During fabrication of sheet aluminum every ounce must be saved—and Sturtevant helps do it! Scrap aluminum is chopped up, then conveyed—entirely by air route—to remelt furnaces at Aluminum Company of America plants.

Toughening Steel for Tanks—To harden steel properly, heat treating furnaces require constant pressure, unfailing air circulation. Chrysler Tank, Caterpillar Tractor and others call on Sturtevant for compressors that help step up capacity —speed production.

marines! It is also supplying the vital blasts of air for thousands of processes and hundreds of industries that are building America's fighting machines.

B. F. STURTEVANT COMPANY
Hyde Park, Boston, Mass. *Branches in 40 Cities*
B. F. Sturtevant Company of Canada, Ltd., Galt, Toronto, Montreal

Sturtevant
REG. U. S. PAT. OFF

Puts Air to Work

STURTEVANT — FOUNDER OF THE AIR HANDLING INDUSTRY

Upping Garand Rifle Production—and a Sturtevant Pneumatic Conveying System is helping to push it up... by speedily whisking away wood dust and shavings produced in turning out the rifle stocks. Air exhausted from the arsenal is returned to the building, after the dust has been screened out—thus saving heat and power for the government.

Helping launch more Ships—For high speed Unionmelt Automatic Electric Welding of ships and boilers, at shipyards, Sturtevant Melt Recovery Units make it possible to efficiently collect all of the unfused melt for re-use.

Protection Against Explosives—During powder manufacture and shell-loading, dangerous fumes and explosive dust must be kept out of the air, away from workers. That's the vital job of Sturtevant Dust and Fume Collecting Systems —at government arsenals and private plants. They guard against respiratory and eye troubles, reclaim waste.

SMALLER POT FURNACES . . .

OR { *Large Installations for Hardening, Quenching and Drawing HIGH EXPLOSIVE SHELLS . . . .*

MAHR MAKES 'EM ALL

◀ LEFT: A battery of MAHR lead melting pot furnaces in use in a large battery plant. MAHR pot furnaces for melting or for heat treating with salt, cyanide etc. are fully described in Bulletin No. 110.

RIGHT: Part of a battery of large MAHR car bottom furnaces used in an important defense plant for carburizing armor plate. ▶

ASTONISHINGLY PROMPT DELIVERIES *are being made on furnaces of all kinds, but plans for new equipment should be discussed now. Ask for special bulletins on any type of furnace you need, and let our engineers consult with you and offer their suggestions. WRITE TODAY.*

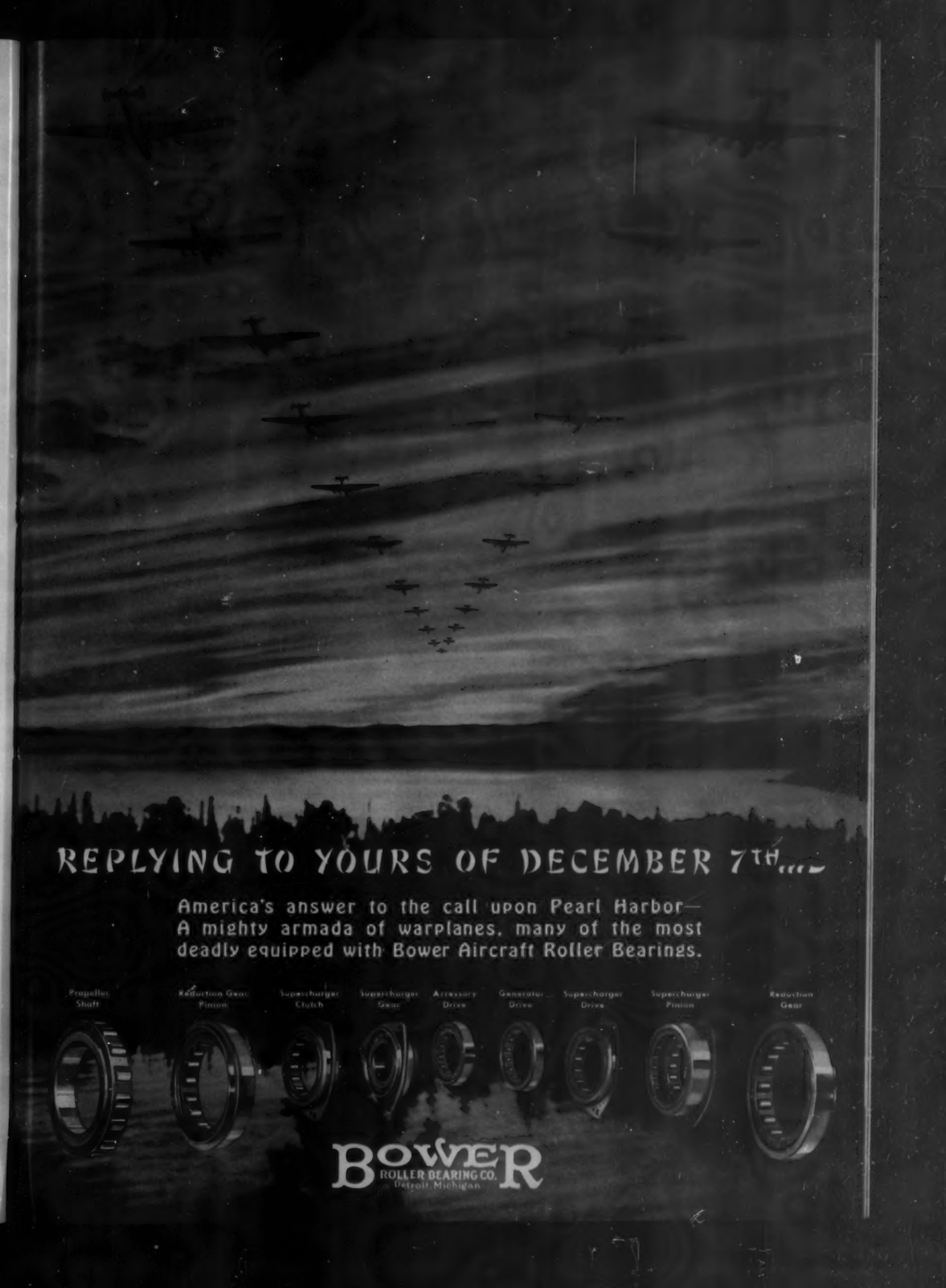
● Yes, whether it's a preheating torch, a blacksmith or rivet forge, a pot furnace, a tool furnace or a complete high explosive shell hardening, quenching and drawing installation, MAHR engineers have made them all. No matter what your heat treating requirements may be, MAHR'S quarter of a century of experience in making all types of furnaces for all kinds of work is at your service. Today, when time is all-important—when the job must be done quickly and *right the first* time, place your confidence in this large and experienced organization.

DIAMAHR

MAHR MANUFACTURING CO.

DIVISION OF DIAMOND IRON WORKS, INC.

MINNEAPOLIS, MINNESOTA, U. S. A.


REPLYING TO YOURS OF DECEMBER 7TH....
America's answer to the call upon Pearl Harbor—
A mighty armada of warplanes, many of the most
deadly equipped with Bower Aircraft Roller Bearings.
Propeller Shaft
Reduction Gear Pinion
Supercharger Clutch
Supercharger Gear
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Generator Drive
Supercharger Drive
Supercharger Pinion
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BOWER
ROLLER BEARING CO.
Detroit, Michigan

SHORT ON SKILLED HELP?

WOMEN OPERATORS and UNSKILLED WORKERS

can easily handle many production jobs . . . on

WALKER-TURNER DRILL PRESSES

because

THEY'RE SAFE: All possible safety devices are incorporated in all W-T Machine Tools. Belts and pulleys are amply covered with approved type guards.

THEY'RE SIMPLE: Easy to set-up and operate. No complication of levers and dials to confuse the novice. They have adjustable heads and tables and positive depth gauges.

THEY'RE DURABLE: Built for 24-hour operation. Production-tested, they *stand up* under the unintentional abuse of inexperienced operators. Four SKF ball bearings insure quiet operation and long life.

THEY'RE EASY TO OPERATE: Careful design and engineering and the absence of unnecesary gadgets reduce dead weight on the spindle to a minimum. This greatly reduces operator fatigue, especially on long runs or continuous operation.

THEY'RE REASONABLE IN PRICE: Remarkably low . . . . and deliveries can be made with reasonable promptness to industries engaged in defense activities.

For further information write

WALKER-TURNER CO., INC. 5042 Berckman St., Plainfield, N. J.

walker-Turner COMPANY, Inc PLAINFIELD, N.J. U.S.A.

WALKER-TURNER MACHINE TOOLS

FOR METAL, WOOD AND PLASTICS

DRILL PRESSES · BAND SAWS · BENCH SAWS · TILTING ARBOR SAWS · LATHES
JIG SAWS · RADIAL SAWS · RADIAL DRILLS · BELT AND DISC SURFACERS · JOINTERS
SPINDLE SHAPERS · GRINDERS · FLEXIBLE SHAFT MACHINES · CUSTOM BUILT MOTORS

CHECK these advantages of the Torrington Needle Bearing—advantages that have been tested and proved in thousands of applications—and see how every feature can be utilized to fill a wartime need in *your* product designs.

1. *The Needle Bearing is available for prompt delivery* on priority orders, in the standard sizes and designs that are most practicable today. Production capacity at Torrington has been expanded to care for all essential requirements with the promptness you need to maintain your manufacturing schedules.

2. *It is easy to install,* ideally suited for high-speed production line methods. Built as a single compact unit, the Torrington Needle Bearing is pressed into place in the housing in a quick, simple operation.

3. *It conserves materials* in other parts of your product design. Because the bearing's outside diameter is small in proportion to capacity, you can use small-diameter housings, requiring less material.

4. *It improves product performance* and reduces power requirements, because of its low coefficient of starting and running friction.

5. *It needs little attention* in service. As a result of its efficient system of lubrication, only occasional renewal of lubricant is necessary. Its high load capacity assures long bearing life, even in continuous operation under heavy loads.

Let a Torrington engineer show you how this unusual bearing can help you key your designs to wartime conditions. For details, wire, phone or write for Catalog No. 110.

THE TORRINGTON COMPANY
TORRINGTON, CONN., U. S. A. • *Estab. 1866*
Makers of Needle and Ball Bearings
New York · Boston · Philadelphia · Detroit
Cleveland · Chicago · Los Angeles · Seattle
San Francisco · Toronto · London, England

EVERY FEATURE
FILLS A WARTIME NEED

TORRINGTON NEEDLE BEARING

INCREASED EFFICIENCY

Torrington Needle Bearings reduce power consumption in the "Lockformer" line of sheet metal working equipment—and with thousands of machines in daily use over a five-year period, bearing replacement has been negligible. Compactness of the bearings is an additional advantage.

THE LOCKFORMER COMPANY

ELIMINATION OF WEAR

The Needle Bearing's low coefficient of friction virtually eliminates wear in the control column of the CESSNA T 50. Replacement costs are kept to a minimum at points where Needle Bearings are used, which include landing gear, aileron hinge, and wing flap hinge.

CESSNA AIRCRAFT COMPANY

LIGHTNESS IN WEIGHT

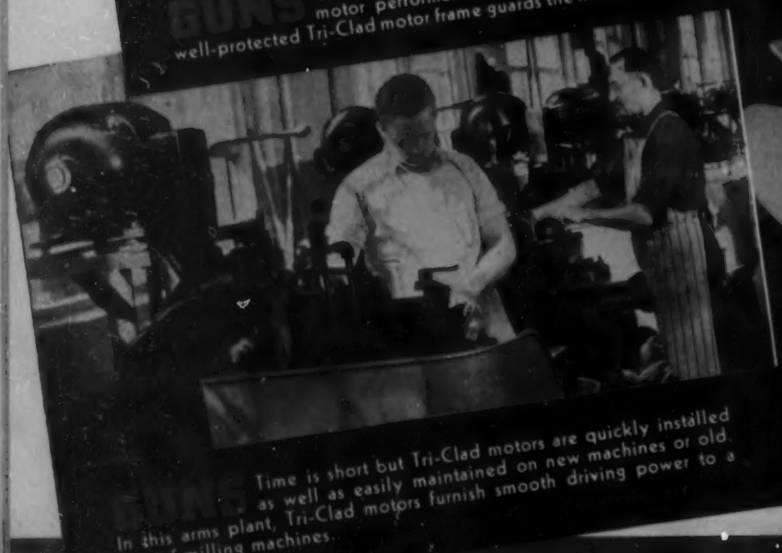
Light weight and small size in proportion to power rating are outstanding features of air-operated portable tools. Compact, high-capacity Needle Bearings aid in attaining these desirable features in this impact wrench manufactured by Ingersoll-Rand Company.

INGERSOLL-RAND

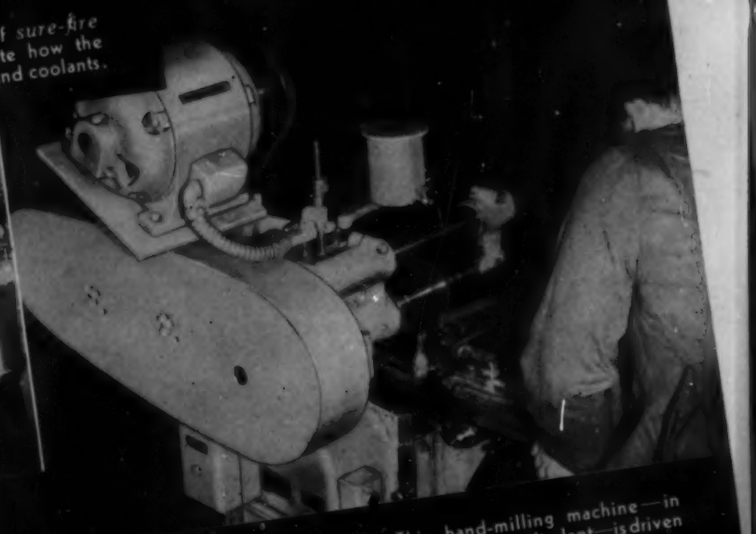
triple-shift operation calls for TRIPLE

GUNS — Greater fire power for democracy grows out of *sure-fire* motor performance on machines like this. Note how the well-protected Tri-Clad motor frame guards the motor from chips and coolants.

SHELLS — This shell-forming machine is typical of many others now in triple-shift operation. Although this Tri-Clad motor is in an exposed location, its cast-iron frame protects it from accidental blows.



TANKS — Time is short but Tri-Clad motors are quickly installed as well as easily maintained on new machines or old. In this arms plant, Tri-Clad motors furnish smooth driving power to a line of milling machines.



AIRCRAFT — This hand-milling machine—in an Eastern aircraft plant—is driven by a Tri-Clad sleeve-bearing motor. The light weight, compactness, and stamina of this motor make it an excellent choice for machines like this.

BUILT FOR PROTECTION FIRST . . . TO LAST!

TOUGH MOTORS

and the EXTRA-PROTECTION Features* of TRI-CLAD Motors

Will Help You Get "All-out" Production

Because of General Electric's own *triple-shift* operation, thousands of these motors are coming off greatly expanded production lines in record time. If you need motors, why not ask your G-E representative about Tri-Clad types and sizes now available?

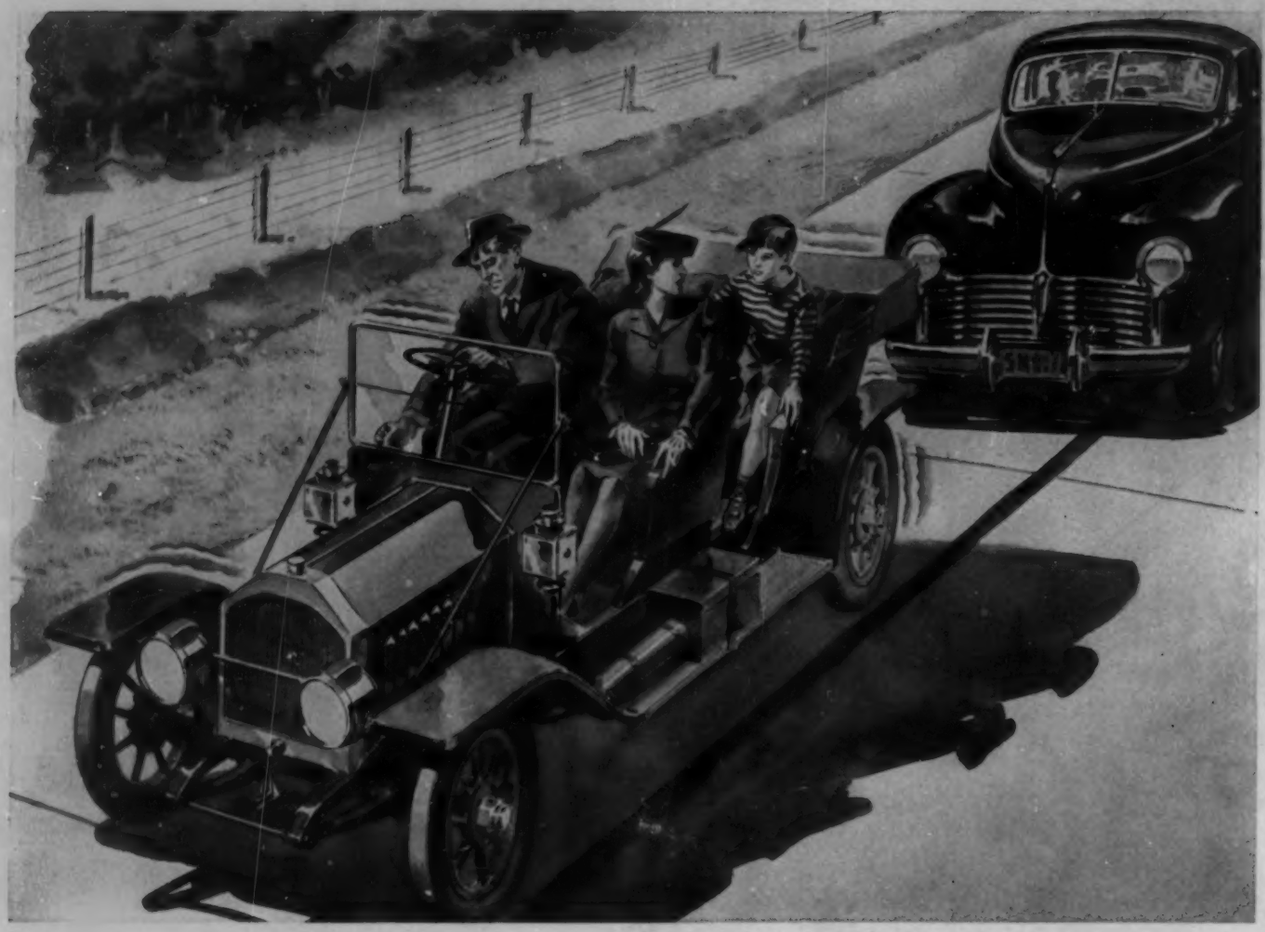
THE extra-protection features of the Tri-Clad motor reduce the possibility of interruptions due to motor failure. Chips and coolants are kept out. The stator winding, of Formex wire, is well-nigh impervious to oil, moisture, and heat shock. Improved bearings contribute greatly to sustained operation even under difficult conditions. And besides, Tri-Clad motors are easy to install and convenient to lubricate.

Why not give your vital war production an *extra* measure of protection? Make sure your next motors are Tri-Clad motors. ***General Electric, Schenectady, N. Y.***

**Extra protection against physical damage, electrical breakdown, and operating wear and tear.*

General Electric and its employees are proud of the Navy award of Excellence made to its Erie Works for the manufacture of naval ordnance.

GENERAL ELECTRIC



SCALES Grow Obsolete, TOO!

The application of Fairbanks Scales to weighing problems is vastly extended by the use of photo-electric cells, automatic printing devices, limit switches, and other electric control mechanisms.

Scales without modern features may be as unsuited to your *present* needs as the car you bought thirty years ago . . . may be needlessly retarding production and increasing costs.

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STEEL

ESTABLISHED 1882

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PRODUCTION • PROCESSING • DISTRIBUTION • USE

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HIGHLIGHTING
THIS ISSUE OF
STEEL

"What are *you* doing to help win the war?" That is a question which now should be asked universally—and E. L. Shaner, STEEL's editor-in-chief, emphasizes how important it is to be able to answer it satisfactorily **(p. 37)**. To many manufacturers who so far have been unable to convert to war work the last week's news brings encouragement. Small companies which have been unable to get necessary financial assistance now can get it from WPB **(p. 42)**. They also will benefit from the creation of the new Smaller War Plants Corp. which will take war contracts and farm them out. Then, WPB is about to try out two new plans aimed at still further enlisting all potential facilities in war production. . . . STEEL's conversion pictorial **(pp. 38-41)** shows how a merry-go-round manufacturer changed over to war work.

• • •

Great Need For Men

Employment in war plants, now 8,000,000, is to be swelled to 18,000,000 before the year's end. To find and train these workers and the supervisory ability that will be required is an enormous task that lies immediately ahead; the situation is all the more difficult owing to the Army and Navy needs for fighting men in large numbers. Significant, therefore, and worthy of careful study, is Sidney Hillman's 14-point "draft labor" plan **(p. 43)**; millions of women will be enrolled to work in war plants **(p. 60)**. . . . While WPB is relying on voluntary support of the war production program by industry, warns James S. Knowlson, it is prepared to use punitive measures whenever that becomes necessary **(p. 48)**.

• • •

Steel Records In March

Adopting Donald M. Nelson's recommendation, the United States Steel Corp. is organizing labor-management committees to expedite production **(p. 44)**; farm equipment program has been revised to meet increased food needs. . . . Steel warehouses will benefit from a revision in prices **(p. 48)**. . . . CIO's demand on the Federal Shipbuilding & Dry Dock Co. for "union security" has been revived **(p. 67)**. . . . Progress is reported in increasing domestic production of many critical minerals **(p. 52)**. . . . More iron and steel production records were made in March **(p. 45)**. . . . Numerous actions have been taken to conserve still further our supply of critical materials **(pp. 50, 51 and 62)**.

• • •

Properties Of Heavy Forgings

In Section VII of the forging series, George Sachs presents a correlated abstract **(p. 76)** on the properties of heavy forgings. . . . E. C. Rinker described **(p. 80)** the precision plating of radio condenser parts, work where plating thickness is extremely critical. . . . Important developments that increase the output of strip steel finishing lines **(p. 85)** include combination units that slit both heavy and light-gage strip, according to R. J. Wean. . . . Ford Motor Co. research produces a method of obtaining iron powder electrolytically **(p. 88)**. The many possible applications of iron powder metallurgy to ordnance work are being investigated since automotive work is now suspended.

• • •

Ductility vs. Weldability

Weldability is a highly important quality of metals today, so the various methods utilized to determine weldability from ductility tests are of special interest. Harold Lawrence examines **(p. 78)** the various types of ductility tests and evaluates them as to their usefulness in determining weldability. . . . Unloading and storing sheet steel by means of a crane and grab cut handling time 96 per cent **(p. 82)** and reduce losses from material damaged during handling. . . . J. A. Corlett tells **(p. 74)** how the straight-line production of Liberty cargo ships is speeding up the output from a typical shipyard. A large number of direct-current multiple-operator arc welding sets are used.

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STEEL
April 6, 1942

PUBLIC OPINION WILL JUDGE DEEDS, NOT YAPPING

Fundamental changes are taking place in the minds and spirits of Americans. Recent events have brought home to them the nearness of war and a full consciousness of its implications.

Among these events have been the payment of income taxes by millions of citizens for the first time; the departure of relatives and friends to war; the demands by the federal government for sacrifice in giving up accustomed conveniences; the appeals for investment in war bonds; and the general implication that additional hardships and sacrifices are ahead.

These events have made the average citizen feel that the war has become his war. He is paying for it, he is sacrificing for it, and his friends and relatives are preparing to die for it.

Consequently, he suddenly has become interested in how his war is being conducted. No longer is he content to let Washington run it according to its concepts. He loathes incompetence, red tape, selfish chiseling by minority blocs, abuse of privilege by the favored, and "business as usual", no matter by whom it is practiced.

The foregoing is a rough description of the attitude members of Congress will discover when they go home to mend their political fences. It is also the attitude which everybody in industry should recognize and heed.

Why? Because in the next 60 days the American people are going to bear down hard on slackers. They are going to be super-critical of self-interest, evasion, red-tape, inefficiency, incompetence and waste.

They will judge industrial management on its deeds in conversion and production — not on how good a yapping job it does against labor and the government.

They will judge labor on its co-operation in increasing production — not on how impressive a smearing campaign it conducts against employers, government and public.

They will judge government on its efficiency in directing the war effort — not on the cleverness of its persecution of management and labor.

If you want to survive the barrage of the next 60 days, prepare to answer this question effectively: "What are you doing to help win the war?"

E. L. Shaner
Editor-in-Chief

DO YOU FULLY REALIZE THAT *This is a Total War*

—That in a total war, everyone must help for no longer are the men at the front the only ones upon whom victory depends

—That every manufacturer's facilities must be employed to produce war goods or civilian necessities

—That it is up to you as an individual manufacturer to use your own ingenuity and resourcefulness to convert your plant to fit this need and to sell your facilities either to Uncle Sam as a prime contractor, or to prime contractors as a subcontractor

CONVERTING your production facilities to handle war work may require some ingenuity, yes, but no more than you employ in setting up your shop to make any new item. Your previous products and the size of your shop make little difference for the production job to be done is so tremendous that every facility is needed.

A typical example of what can be done "where there's a will . . ." is the case of a prominent manufacturer of merry-go-rounds and thrill rides for amusement parks and fairs who says, "We realized that our plant should help out in ordnance production to aid our country in this emergency and to assure our staying in business even though converting our plant to arms work meant much planning and reschooling of employes. We had to change over completely from ordinary machine work and structural fabricating to the highest type of precision operation, but our engineering department did the job.

"An airplane company gave us our first subcontract—to make a large quantity of hooks to be used on plane packing cases which were to be shipped abroad. This was an interesting job as it required a large press to bend the hooks to shape. We didn't have the press, but we did have a horizontal bulldozer which we used to shape the tracks of many of our thrill rides (Fig. 1). And in spite of protests that it couldn't be done, we adapted this equipment to produce the hooks (Fig. 2)."

The company was so successful in obtaining additional subcontracts

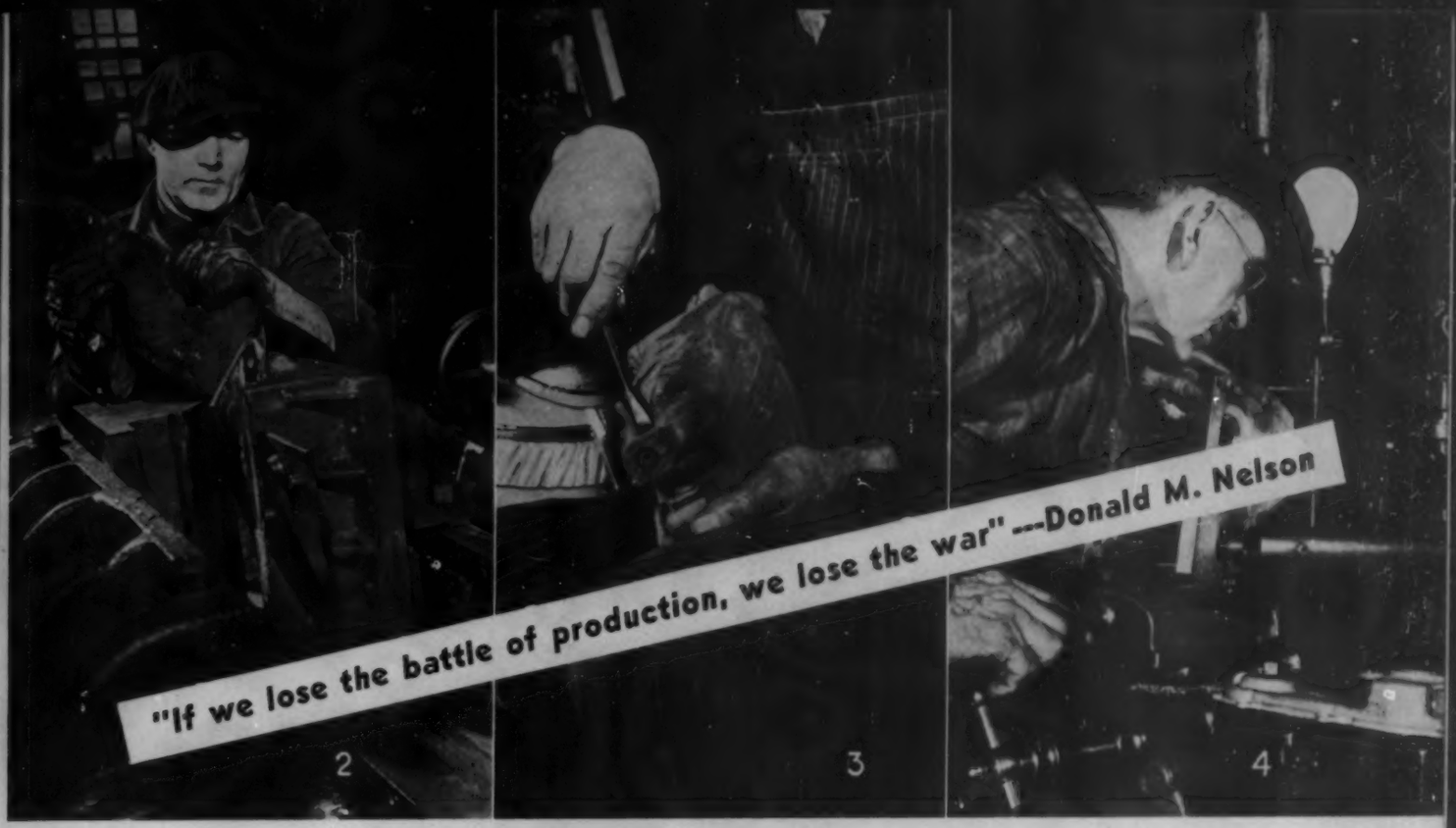


Fig. 1—In times of peace, this horizontal bulldozer was employed to shape rails for merry-go-rounds and other thrill rides to delight the hearts of carefree children. A rail being bent for a merry-go-round is shown here

Fig. 2—But today the same workman uses the bulldozer to shape heavy plate into hooks for export packing cases for aircraft engines. Although many said it was "impossible" to convert the bulldozer to handle this work, a little thinking and ingenuity solved the problem. Changing the dies and taking the slack out of the operating members did the trick. Photos from Office of Emergency Management, by Gruber

Fig. 3—The skilled hands shown here belong to a 65-year-old workman whose woodcarving skill delighted thousands of children riding the merry-go-round horses which he made. Here he is finishing up some of the last carvings to come from this plant before its conversion

Fig. 4—Who says, "An old dog cannot learn new tricks?" Here the same craftsman who for years carved heads for merry-go-round horses is busy operating a lathe engaged in machining landing gear housings for the dread Airacobra pursuit ship, one of the fastest and most deadly of our fighter aircraft

that it was forced to increase its mechanical staff from 20 to 41 men. Jobs included making jigs and fixtures for tank production as well as gun mounts, tools, punches, dies and gages for aircraft production. "This kept our machine shop going full blast," says the manufacturer, "so we turned to other classes of work for our fabricating, erection and woodworking departments. The plane plants require hundreds of assembly stands, shop dollies and other devices, all involving metal work of an accurate nature.

"The Navy Department Bureau of Aeronautics required special equipment to service large seaplanes. We were commissioned to design and build a sample. This job involves great secrecy, but I can say it was a portable device to be taken down and put up in a hurry and packed in a self-contained haul-away outfit. We also developed and constructed many sets of automatic motorized transfer tables, devices used in connection with large hydraulic presses to move work and dies under the press ram in a fast continuous sequence, thus enabling each press to do the work which normally would require four presses."

By doing war work, this manufacturer thus keeps his plant alive despite shortages of materials for non-essential products like merry-go-rounds. He enables his employes to work where they are instead of forcing them to roam the country looking for jobs. Most important, he helps in the battle of production by turning out needed war items *right*

HERE'S HOW . . .

to get war work

Make a survey of your plant facilities, listing equipment, types of skilled workmen and products already made.

See your local district ordnance office for names of prime contractors in your vicinity who may be able to utilize your facilities on subcontracts. For list of War Production Board Contract Field Offices, see STEEL, Feb 23, 1942, p. 21, Section Two.

If no subcontracting possibilities appear, form a pool with other manufacturers in your vicinity and get a contract for something you can make together. Or perhaps the "mother hen" plan would be the best way for your facilities and those of your neighboring plants to get into war work.

But find out! Get started NOW while your efforts can still count in vital 1942.

now in this critical year, 1942, when his country needs them most.

Here, certainly, is an example of how a manufacturer has used his ingenuity and resourcefulness to develop work for his plant by selling his facilities to the suppliers of our armed forces. For other examples of plant conversion, see STEEL, Feb. 9, 1942, p. 54—"England Converts Small Plants to War Work"; Feb. 23, p. 21—"Auto Industry Converts to War Work"; March 9, p. 68—"Porcelain Enameling Furnaces to Heat Treating Units"; p. 70—"Toy Trains to Parachute Flare Casings"; p. 83—"Well Planned Materials Handling Helps Contractor Build Steering Engines"; March 16, p. 30—"Floor Waxers to Small Gun Mounts"; March 23, p. 26—"Steelworks Equipment to Gun Manufacture"; p. 30—"Spring Makers Produce Armor Plate"; p. 41—"Bakery Machinery to Trench Mortars"; p. 49—"Kitchen Ware to 'Tin Hats'"; p. 64—"Auto Bodies to Aircraft." For miscellaneous conversion examples see STEEL, March 2, 1942, p. 32, and March 16, p. 34.

If you would like to have additional details concerning any of these conversions, or if you believe you could improve their efficiency or effectiveness, go to your local District Ordnance Office or nearest War Production Board Field Office (see list page 21, Section Two, STEEL, Feb. 23). Refer to WPB Release No. 274 for details on the job shown.

Fig. 5—Instead of making parts for carrousels and other thrill rides, this drill press has been converted into a milling machine. Now the same operator handles face milling operations on landing gear parts for our rapidly growing armada of air fighters

Fig. 6—On another subcontract, the amusement device manufacturer now produces completed shell ejectors. Here one of these units is receiving its final test. The brass bottom of a naval shell is applied on the testing stand, with the spring mechanism that actually ejects the shell getting the primary test

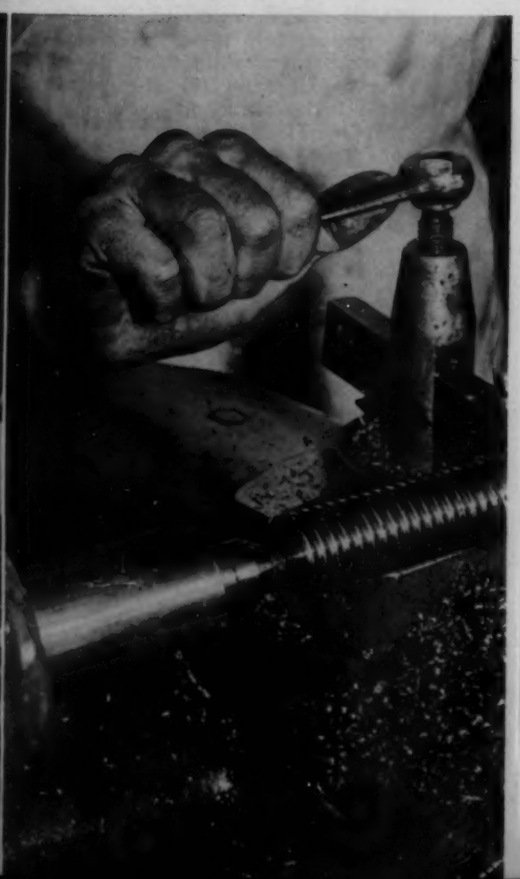
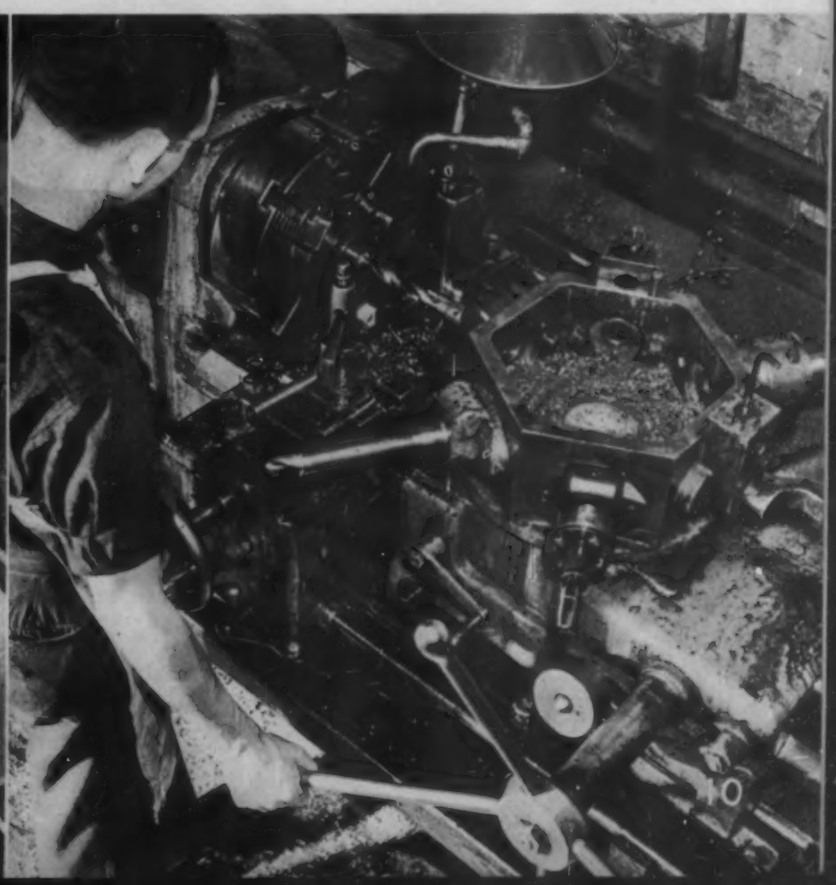


Fig. 9—Here is an operation on another part produced under a subcontract in this plant. The part is a cable sheave. It is being machined on a Bickford vertical boring mill that previously was employed in making amusement devices. All photos furnished by Office of Emergency Management and made by Gruber

Fig. 7—The merry-go-round factory now produces many different war parts on subcontracts from army and navy prime contractors simply by "selling" its plant facilities and using some ingenuity to handle the conversion of equipment as shown here. First step in making a shell extractor is to turn down a rod

Fig. 8—Here the shell extractor for a 6-inch 47-caliber naval rifle is having an Acme type thread roughed out on a South Bend swing lathe formerly used to make parts for merry-go-rounds and other rides for amusement parks and fairs. A new cutting tool made this conversion possible

Fig. 10—This South Bend swing lathe is another of the machine tools now used to produce bits and pieces for our war program. Ingenious retooling program employed here makes such production equipment adaptable to an extremely wide variety of war work. No doubt your production men are equally as resourceful. Why not back them up with an intensive "selling" campaign among contractors in your vicinity to get your plant into war production NOW? Or form a pool, or get into one of the "mother hen" setups being organized among small plants—but get going and find your place in this battle of production



WPB Finance Bureau Established To Aid Conversion Efforts

◆

Advice and assistance will be supplied companies entering war production or desirous of obtaining subcontracts . . . Especially designed to help small businesses

◆

WASHINGTON

ORGANIZATION of a Bureau of Finance in the Division of Industry Operations to assist contractors and subcontractors in solving financial problems which may arise in connection with the handling of war orders was announced last week by J. S. Knowlson, director of industry operations.

Bureau will take over the functions and personnel of the financial section of the Contract Distribution Branch of the WPB Production Division. Bradley Nash, who has been head of this financial section since June, 1941, will be chief of the new unit. Mr. Nash was formerly consultant to Delafield & Delafield, financial advisors of New York.

Transfer of the bureau to the Division of Industry Operations will make possible closer contact between the bureau's financial experts and the staffs of the industry branches in the division, with special reference to financial problems involved in converting civilian industries to war work.

The Bureau of Finance does not make any loans or dispense any funds to contractors, but furnishes advice and assistance about financial matters to companies engaged in war production or desirous of obtaining war contracts or subcontracts. It also endeavors to be helpful in working out the financial requirements when a group of manufacturers undertake to form a pool of facilities for war work.

The Bureau of Finance now has about 35 representatives located in WPB field offices to establish direct contact with companies which need financial advice and assistance. The staff has recently been handling about 500 new cases a month. These cases involve amounts running from as little as one thousand dollars up into millions.

Bureau endeavors wherever possible to arrange financing of war work through commercial banks, and frequently is able to obtain commercial loans for war contractors or potential contractors by advising them on consolidation of outstanding obligations or by demonstrating that their war contracts constitute a sound basis for making a loan.

Will Aid RFC Applications

When the required financial assistance cannot be arranged through a commercial bank, the bureau assists the contractor to make the proper application to the Reconstruction Finance Corp., a Federal Reserve bank or other government financing agency.

Bureau has been devoting particular attention to the problem of helping small firms put themselves in satisfactory financial shape so that they can submit bids for war contracts or subcontracts.

Close contact will be maintained with the industry branches of the WPB to determine the financial needs of industries which are or may be engaged in war work. The recommendations of the industry branches will be given particular weight when financial assistance is requested for expansion or improvement of production facilities.

Financial advice and assistance are provided by the bureau for companies which have difficulty in obtaining sufficient working capital to handle war contracts as well as for those which need to expand or alter their production facilities.

Bill providing for creation of a $100,000,000 Smaller War Plants Corp., under WPB supervision, to give assistance to small businesses converting to war production, was approved last week by the United States Senate by an 81-to-0 vote.

The new agency would be empowered to take war contracts and farm them out among small firms, and to make loans to companies which need money to take part in the war effort.

The new corporation, whose five directors would be appointetd by WPB Chief Donald M. Nelson, would be authorized to obtain contracts from Army, Navy and other government agencies.

Conversion Plans To Be Tried In Cleveland, Chicago

Two plans to expedite conversion of potential manufacturing facilities to war production will be tried out soon by the WPB Production Division. One, a fairly simple plan, will be tried out first in Cleveland. The other, known as the Stanlev plan, will be put to a trial in the Chicago area. From experience gained will come methods to be used generally.

The Cleveland office, Contract Distribution Branch, WPB Production Division, will ask prime contractors, principal suppliers, as well as procurement officers of the armed services to fill in a new form, WPB-740, listing work that may be subcontracted: along with WPB-740 will go WPB-740A which explains the use of WPB-740. The filled-in form WPB-740 is to be sent to the nearest CDB office which, in turn, will check its "Summary Machine Facilities Records" and send copies of the filled-in form WPB-740 to the companies that appear to be in a position to take the work, in whole or in part.

Procurement officers, prime contractors or suppliers also may send copies of the filled-in form WPB-740 to potential subcontractors they may have in mind.

The Stanley plan, to be tried out at Chicago, would facilitate subcontracting through a Directory of Contract Opportunities and is aimed at bringing the job to the machine rather than the machine to the job. "In the necessary and rapidly growing full production campaign it would utilize the present facilities with their present trained personnel who would live in their present homes."

Under the Stanley plan the prime contractor takes the first step. From his operations sheets he describes in code the essential phases of the subcontract job. By punch cards

the information is assembled as a complete directory which is to be mailed to a list of subcontractors each week. By checking carefully, the subcontractor can identify such requirements as he is in a position to produce.

The Stanley plan, developed by James S. Stanley, formerly with the Contract Distribution Branch, is said to have produced good subcontracting results in trials in Indianapolis and Lafayette, Ind., and in connection with the Lester plant of the Westinghouse Electric & Mfg. Co.

Incidentally, the Contract Distribution Branch now has complete information about some 750,000 individual machine tools in approximately 50,000 plants, of which about 20,000 plants are in the metalworking field and employ 25 or more workers. As a result, this branch has been able to render increasingly effective service in advising where desired facilities are to be found.

Kaiser Asks Permit To Build New Steel Plant

Henry J. Kaiser Co., Oakland, Calif., last week applied to the San Bernardino county board of supervisors for a permit to erect a steel plant, estimated to cost $40,000,000 (STEEL, March 16, p. 38).

An additional $10,000,000 will be spent in the development of San Bernardino county ore deposits.

Fourteen-Point Program for Labor "Draft" Outlined by Hillman

WASHINGTON

FOURTEEN-POINT plan to mobilize men and women for work in war industries, including the power to transfer workers from one factory to another, was laid before the Senate labor committee last week by Sidney Hillman, WPB labor director.

Mr. Hillman told the committee 8,000,000 more war workers would be needed this year.

Consolidation of all federal defense training agencies under a unified control was suggested as a part of the program. Members of the committee suggested that Mr. Hillman should be generalissimo in charge of such a program.

He advanced his program during hearings on a bill introduced by Senator McKellar, Tennessee, designed to abolish the National Youth Administration and the Civilian Conservation Corps. Senator McKellar's bill was opposed by Mr. Hillman who insisted the youth agencies were performing a valuable duty in training defense workers.

Mr. Hillman's 14-point program:

1—Directives should be sent to all war contractors that all skilled craftsmen must be employed at jobs utilizing their best skills. To insure compliance with this directive, the utilization of a staff of plant inspectors is required with the authority to review as frequently as deemed necessary detailed plant operations. Provision must be made for compulsory acceptance by the plant management of the recommendations of government plant inspectors relative to the utilization of skilled workers and of training programs necessary for training within the plant of supervisory personnel, professional and technical personnel, of semiskilled workers being upgraded to take on skilled jobs, and of beginners.

2—Procurement officials and other persons placing contracts should be directed to keep informed of and give due consideration to the labor supply situation in communities in which they are planning the placement of contracts. Representatives of the labor division should be consulted in the initial stages of all contract negotiations.

3—The President should issue an executive order centralizing control of all federal agencies engaged in defense training.

4—The President should issue an executive order designating the United States Employment Service under the direction and supervision of the War Production Board as the single agency to control recruitment and placement of workers in critical occupations essential to war production.

5—The War Production Board should set up the mechanism necessary to establish priorities of production by items of equipment and priorities of plants manufacturing such equipment in order that proper labor priorities may be determined.

6—Authority should be obtained for transferring workers among employers in accordance with the needs of war production program. Such authority should include provision for protection of seniority and other rights acquired by workers being transferred as well as transportation costs.

7—The War Production Board should direct all contracting departments and agencies to take the necessary action to insure the full utilization of the local labor supply, including women and minority groups.

8—In-migrant war workers should have first call on all war housing. The bulk, if not all, of war housing should be rented to war workers without requirement compelling them to purchase such housing. In more critical areas, dormitories should be provided to accommodate workers whose families have been left in their former homes. In addition, authority should be obtained

PRESIDENT'S PENS: In good humor, the President is shown distributing pens with which recently he signed the order authorizing the Army, Navy and Maritime Commission to guarantee or make loans for war production to small businesses and subcontractors. Left to right: Senator James Murray, Montana; Senator Arthur Capper, Kansas; Senator James Meade, New York; Undersecretary of War Robert P. Patterson; Undersecretary of Navy James Forrestal; and Admiral E. S. Land of the Maritime Commission. NEA photo

to requisition existing housing space for war workers.

9—To prevent delays in war production through the breakdown of local transportation systems, action should be taken to stagger hours for departments of large industries, schools, office workers and shoppers; and to obtain greater utilization of rail services, intercity and sightseeing buses and other means of transportation used for services not essential to the war effort.

10—Legislation should be obtained authorizing the War Production Board to mobilize a mobile labor corps of such size and in such skilled occupations as are deemed necessary for the prosecution of the war effort.

11—The War Production Board should curtail less essential production and services if and when necessary to meet the man power problem of war production.

12—A national manpower board should be promptly established.

13—Man power boards should, among other things, promptly consider the realistic and practical determination of the military needs of the Army and Navy on one hand and industrial needs on the other. This consideration should include controls necessary to prevent wastage of skills through voluntary enlistment in the Army and Navy.

14—The necessary action should be taken to establish wage stabilization agreements wherever they are feasible.

SWOC Asks Exclusive Bargaining Power in 54 "Big Steel" Plants

Steel Workers Organizing Committee has filed election petitions with the National Labor Relations Board seeking exclusive bargaining rights for all employes in 54 plants of the United States Steel Corp. Present contracts between the union and corporation permits bargaining for members of the union only.

Petitions cover all major subsidiary plants except those of the Tennessee Coal, Iron & Railroad Co., Birmingham, Ala., and the Gary, Ind., works of Carnegie-Illinois Steel Corp.

U. S. Steel Corp. Organizing Labor-Management Committees

United States Steel Corp. subsidiaries are taking action to form labor-management production committees in line with the recent request of War Production Chief Donald M. Nelson, according to B. F. Fairless, U. S. Steel president.

Mr. Fairless said: "Our policy has been and will continue to be one of full co-operation with both government and labor to bring about the desired production goal, which we recognize to be of supreme importance to this nation."

More Steel Made Available for Farm Equipment

WASHINGTON

WPB has revised its 1942 farm equipment program to meet increased food demands being made upon the country's farmers as the result of the war.

Changes in the program, designed to provide machinery for greater production of edible oil, sugar, potatoes and general food products, are expected to add approximately 25,000 tons of materials, mostly steel and iron, to estimated requirements of farm equipment manufacturers for the period from Nov. 1, 1941, to Oct. 31, 1942.

An A-3 preference rating is made available to manufacturers to obtain materials going into the equipment. The original program, announced Dec. 28, 1941, carried the same rating and was based on estimated requirements of 1,793,647 tons of materials for new machines, repairs and export operations during the 12-month period.

In amendments to Preference Rating Order P-95 and Limitation Order L-26, WPB revised the program to include irrigation equipment, vitally needed in certain Western states, and increased the manufacturing percentage quotas of various types of machinery needed to carry out the Department of Agriculture's expanded food program.

The increase in estimated material requirements as the result of revision of the program is brought about as follows:

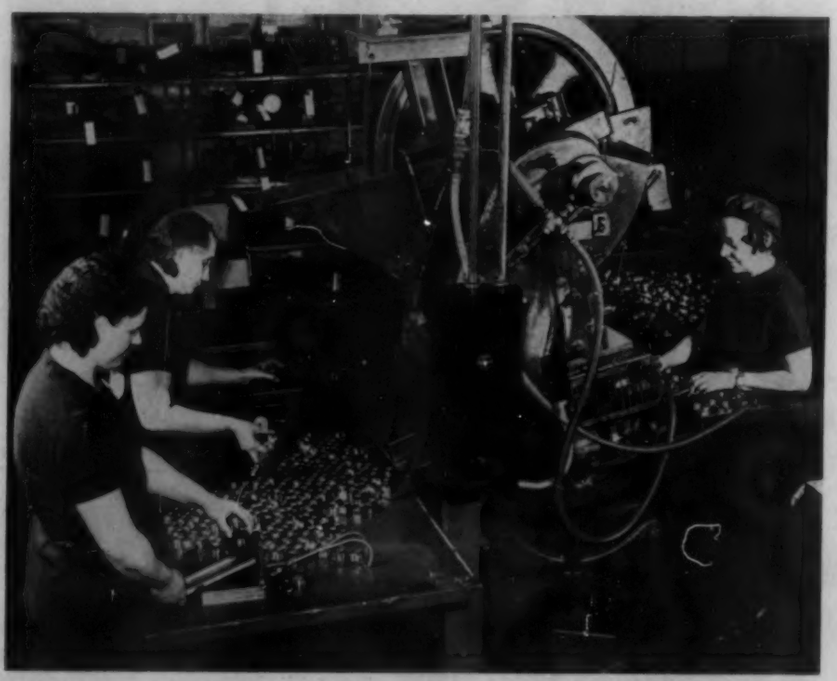
Irrigation equipment not included in the original program, approximately 17,000 tons.

Thirty-six hundred peanut pickers required to produce more edible oil because of the loss of normal sources in the Far East, 1733 tons.

One row tractor drawn or mounted cultivators, for which no percentage quota was fixed in the original program because insufficient data was available, approximately 4800 tons.

The remaining tonnage is distributed among various types of machinery needed to meet increased demands for sugar, potatoes and general food products, such as beet cultivators, drills and lifters, potato planters and steel plow shares. For example, manufacturers were permitted to make during the 12-month period under the original program up to 64 per cent of the number of beet cultivators they produced or sold during 1940. The revised pro-

Women at Fisher Body Making Bomb Caps



EACH of the little metal knobs shown is a bomb nose which eventually may find its way into Axis territory. Thousands of these incendiary bomb noses are being machined by women in General Motors' Fisher Body division

gram permits them to make up to 100 per cent.

Some of the other changes in percentages are: horse or tractor drawn potato planters, 58 per cent to 72 per cent; horse or tractor drawn beet drills, 57 per cent to 100 per cent; steel plow shapes or shares, 71 per cent to 140 per cent; horse or tractor drawn steel lifters, 84 per cent to 130 per cent; cylinder-type power corn shellers, 33 per cent to 80 per cent, and harness hardware, 75 per cent to 100 per cent.

Steelmakers Report New Tonnage Records for March

Republic Steel Corp., Cleveland, in March broke its production records established in October, which had exceeded the prior records of March, 1941. New levels were reached in pig iron, steel ingots and electric furnace steel.

New records were set in every steel-producing district. An accepted world's record for pig iron production from one blast furnace also was topped. Output of ship plates and steel bars substantially exceeded all prior figures.

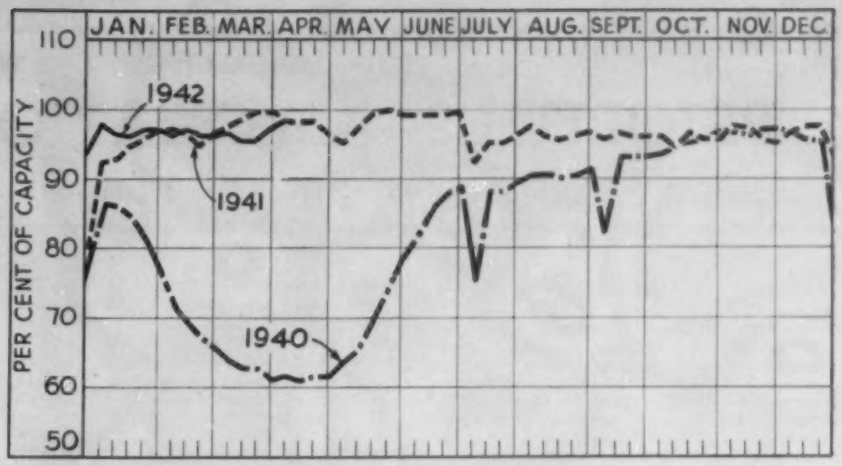
Last week Republic was reported to have begun clearing ground in Pike County, Kentucky, for a new coal mine which may become one of the largest operations in the eastern part of the state.

Armco March Record Best In 31 Years Operation

Greatest production of steel for one month in the 31 years history of the Middletown division of American Rolling Mill Co. was made in March. New records were set by the blast furnace, open-hearth, blooming, bar and strip mill departments.

Great Lakes Stack Sets Two New World Marks

Daily and monthly world records for blast furnace production were broken in March by Zug Island furnace of Great Lakes Steel Corp., Detroit, with straight ore burden production for the month of 43,478 tons and 1608 tons for the final day. Previous world record of 41,782 tons for a single month was set a few weeks ago at Pittsburgh. The new figure is about 40 per cent greater than the average for a large furnace before Pearl Harbor. This is the second record made by this furnace. It was blown in Dec. 9, 1941, after only six months' construction work.



PRODUCTION . . . . Up

PRODUCTION of open-hearth, bessemer and electric furnace ingots last week advanced ½-point to 98 per cent. Four districts increased, one declined and seven were unchanged. A year ago the rate was 98 per cent; two years ago it was 61½ per cent, both rates being computed on the basis of capacity as of those dates.

Youngstown, O.—Production was maintained at close to 94 per cent again last week but lack of scrap forced out an open hearth at the week end. This week's schedule is for 93 per cent.

St. Louis—Addition of an open hearth by one interest raised the rate 4 points to 87 per cent. Better scrap supply probably will enable another mill to light a furnace soon.

Chicago—Up ½-point to 104½ per cent, equal to the all-time high of December. All six producers operated at 100 to 106.3 per cent and March output is expected to be a record.

Cleveland—Small increase by one interest lifted the rate 1 point to 90½ per cent.

Cincinnati—Steady at 92 per cent.

Birmingham, Ala. — Unchanged at 95 per cent for the eighth week. A new blast furnace of the Tennessee Coal, Iron & Railroad Co. at Fairfield, Ala., is to go into blast within a short time.

Pittsburgh — Advanced ½-point to 96½ per cent as slight changes were made in active open hearths.

Wheeling—Continued at 82½ per cent.

Detroit—Declined 5 points to 88 per cent as scrap supply still is uncertain.

New England—With one producer at full capacity the district rate remained at 80 per cent pending completion of repairs by another.

Buffalo—Scrap supply is at a better level and steel production continued at 93 per cent.

Central eastern seaboard — Held output at 90 per cent.

District Steel Rates

Percentage of Ingot Capacity Engaged In Leading Districts

	Week ended April 4	Change	Same week 1941	Same week 1940
Pittsburgh	96.5	+ 0.5	102	57.5
Chicago	104.5	+ 0.5	101.5	57.5
Eastern Pa.	90	None	96	59
Youngstown	94	None	97	42
Wheeling	82.5	None	88	61
Cleveland	90.5	+ 1	96	68
Buffalo	93	None	88.5	46.5
Birmingham	95	None	90	81
New England	80	None	92	65
Cincinnati	92	None	93.5	53
St. Louis	87	+ 4	98	51
Detroit	88	— 5	74	79
Average	98	+ 0.5	*98	*61.5

*Computed on basis of steelmaking capacity as of those dates.

Coke Oven Expansion Ahead of Schedule

WPB's coke oven expansion program is well ahead of schedule, Don Watkins, chief of the construction unit, Iron and Steel Branch, said last week.

Koppers Co. is installing eight batteries, he reported.

WPB expects to have 1713 new ovens completed by the end of 1943; 435 of these will be completed by the end of this year.

Mill Supply Men To Hear Requirements Chief

A. L. Williams, chief, Production Requirements Branch, WPB, will be one of the principal speakers at the annual Triple Mill Supply Convention in Atlantic City, N. J., May 4-6. Members are requested to submit questions concerning operation of the production plan by April 15.

REVISIONS AND ADDITIONS TO

PRIORITIES—ALLOCATIONS—PRICES

as published in Section Two of STEEL, Feb. 23, 1942

M ORDERS

M-6-a (Amendment): **Nickel**, effective March 30, 1942. Adds solutions, concentrates and residues from which nickel commercially recoverable to forms of nickel covered by order; also adds nickel salts, oxides and carbonates. Nickel may be delivered without specific authorization by Director of Industry Operations only to Metals Reserve Co.

M-11-j: Zinc, effective April 1, 1942. Sets April pool at 60% of producer's January, 1942, production of high grade and/or special high grade zinc, and 40% of all other grades. No zinc oxide or dust included in April pool.

M-15-b (Amendment): **Rubber**, effective April 1, 1942. Reduces permitted use of crude rubber or latex in more than 50 products, eliminates use entirely in 20 others.

M-17 (Amendment). **Pig Iron**, effective March 28, 1942. Eliminates reserve tonnage pool in placing all production under mandatory allocation. Buyers file PD-69 with producers by 5th of month before purchasing iron and file PD-70 with WPB by same date. Producers file PD-71 and PD-71d by 12th of each month. Producers using their own iron required to report priority ratings on their production schedules.

M-19 (Amendment): **Chlorine**, effective March 30, 1942. Effective date of M-19, as amended Feb. 25, relating to products containing chlorine, due to become effective April 1, postponed to May 1.

M-21-d (Amendment): **Chrome Steel**, effective March 27, 1942. Limits use of steel containing 4% or more of chromium to ratings of A-1-k or higher. Original order specified ratings of A-10 or higher.

M-30-g: Lead, effective March 30, 1942. Sets April pool at 15% of February, 1942, production.

M-53: Printing Ink, effective March 30, 1942. Limits use of following to 70% of 1941 rate in making printing inks: Chrome yellows and oranges, molybdate orange, chrome green, orange mineral and organic pigments. Use of iron blue limited to 100% of 1940 rate.

M-58: Glycerine, effective March 30, 1942. Deliveries of more than 50 pounds monthly placed under allocation, effective May 1, except for war orders and health supplies. Use for making anti-freeze banned, other uses limited to 70% of average 1940 rate. Users file PD-362 monthly with suppliers and WPB. Refiners and producers report on PD-363. Users of over 50 pounds in any of past six months report before May 1 on PD-361.

M-77: Rapeseed Oil, effective March 23, 1942. March consumption limited to 1941 monthly average. After March 31, use limited to making marine engine, heavy machine engine lubricating and pneumatic tool oils; factice for compounding rubber; blown rapeseed oil used in manufacture of above grades.

M-103: Dyestuffs, effective March 28, 1942. Sets aside various dyes for war use and restricts civilian use of other dyes.

M-109: Rough Diamonds, effective March 27, 1942. Requires owners of 10 carats or more of rough diamonds on March 31, 1942, to report them to WPB on PD-376 by April 15, 1942. Sales and imports of more than 5 carats must be reported within 10 days on PD-377; smaller sales must be reported monthly on PD-378. Does not cover cut or polished gems nor rough diamonds in a tool in use. Diamonds in unused tools must be reported.

M-111: Tea, effective March 27, 1942. Restricts distribution of all supplies.

M-112: Antimony, effective March 30, 1942. Provides for full allocation, starting May 1, 1942. April deliveries limited to January or February rate but none on ratings below A-10. Effective July 1, all use banned for paints, lacquers, enamels or for making toys and ornaments. Use of new antimony for auto battery alloys limited to 7% of total antimony use, and total antimony content of such alloy limited to 7½% by weight. No alloy may contain more than 0.5% antimony by weight or 0.5% above minimum required by specifications. Consumers file orders with suppliers by 20th each month on PD-381 and report to WPB on PD-380. Holders of more than 100 pounds of antimony must file PD-380 by April 20.

M-115: Collapsible Tin Tubes, effective April 1, 1942. Bans production of tubes containing more than 7½% tin, except for certain pharmaceutical preparations. Permits use of tubes containing 7½% tin for tooth pastes and shaving creams, but retail buyers must turn in used tube for each new one bought.

M-123: Asbestos Textiles, effective March 30, 1942. Limits deliveries by manufacturers to makers of industrial packings, such as gaskets, pump packings, etc., and to fill orders with rating of A-10 or higher.

P ORDERS

P-46: (Amended): **Utilities**, effective March 26, 1942. Grants A-2 rating to materials required for maintenance, repair and operating supplies for power plants and pumping plants; A-5 rating granted for all other facilities, also for materials to provide water or power facilities to projects having A-5 or better rating and for materials needed to protect plants against sabotage. Line extensions to serve new consumers restricted to 250 feet. Restrictions on material receipts changed from period in which delivered to period in which delivery scheduled. Limitation of inventories on additional receipts also modified.

P-89 (Interpretation): **Chemical Industry Supplies**, issued March 27, 1942. Defines operating supplies to include drums, containers and other packages, and materials to be physically incorporated in them, as well as materials used for sealing or fastening packages.

P-94: Printing Ink, effective March 30, 1942. Assigns A-5 rating to deliveries of material for manufacture of printing inks.

P-95 (Amendment): **Farm Machinery Material.** Adds irrigation equipment to various types of equipment in building of which A-3 rating is available for delivery of material.

P-115 (Interpretation): **Canning Plants**, issued March 27, 1942. States that canners who use leased machinery are entitled to the same preference ratings for repair and maintenance as if they owned the machinery.

E ORDERS

E-1-a (Amendment): **Machine Tools**, effective March 26, 1942. Excludes drill chucks from types of chucks controlled by the order. Prevents orders received after March 25, 1942, for any tool from being given priority standing in production schedules unless rating assigned by PD-1A or PD-3A certificate or by Order P-19-h is endorsed on order.

L ORDERS

L-1-a (Amendment): **Motor Trucks**, effective April 2, 1942. Authorizes builders of trucks weighing 9000-16,000 lbs. to use up fabricated or semi-fabricated materials on hand Feb. 28 to fill orders for certain war needs and government agencies.

L-5-b (Amendment): **Domestic Mechanical Refrigerators**, effective March 26, 1942. Lifts restrictions on sales by retailers, except for gas and kerosene units. Amendment to L-5-c, effective March 28, exempts kerosene refrigerators from ban against refrigerator production after April 30.

L-7-b: Domestic Ice Refrigerators, effective March 31, 1942. Orders continuation during subsequent quarters of existing limitation on steel consumption of 65% of rate of use in year ended June 30, 1941. After June 30, steel use per box limited to 20 pounds.

L-13-a: Metal Office Furniture and Equipment, effective April 1, 1942. Prohibits manufacture of metal filing cabinets, safes, visible record equipment and metal shelving except on Army, Navy or Maritime Commission orders or on those rated A-2 or higher. Restricts steel use in making Group III products during April and May to 40% to 60% (depending on size of manufacturer) of average consumption in base period; bans all production of these products after May 31. Steel use in making metal shelving held to 50% of base period rate, but production continues until otherwise ordered. Manufacturers prohibited from disposing of steel inventories except on orders rated A-2 or better or on orders for RFC agencies.

L-18-b: Vacuum Cleaners, effective April 1, 1942. Bans production after April 30, 1942. April production limited to 3900 units or 60% of monthly average factory sales in year ended June 30, 1941, for each large manufacturer

For additional revisions and additions please see STEEL of March 2, p. 39, March 9, p. 38, and March 16, p. 39, March 23, p. 35, March 30, p. 23.

(Class "A"); 75% of average sales in base period for smaller producers (Class "B").

L-26 (Amendment). **Farm Machinery,** effective March 30, 1942. Revises quotas of various types of machinery permitted to be manufactured from Nov. 1, 1941, to Oct. 31, 1942. Increases estimated material requirements, mostly iron and steel, by about 25,000 tons.

L-29: Metal Signs, effective March 25, 1942. Metal use in making signs of more than 36 square inches limited during second quarter to 12½% of use in 12 months ended June 30, 1941. All metal use banned July 1. Signs containing less than 5% of metals by weight not affected. Iron and steel stocks may be sold only on orders rated A-3 or higher, except to government agencies.

L-30: Household Utensils, effective March 31, 1942. During second quarter of 1942, steel use to make cooking utensils cut 10% from amount of scarce materials (iron, steel, tin, aluminum, nickel, copper and alloys, chromium and lead) used in 12 months ended June 30, 1941. In making kitchen ware and essential household articles, steel use cut 30%, zinc use cut 50% from zinc consumption in base period. In making nonessential household and other miscellaneous articles, use of iron, steel and zinc cut 50%; 100% after June 30.

L-42 (Addition): **Plumbing and Heating Simplification,** effective April 16, 1942. Schedule VI establishes types and sizes for tubular radiators, eliminating production of large units. Schedule VII, effective April 1, restricts copper and copper alloy use in hot water heaters and piping systems.

L-64 Burial Equipment, effective March 28, 1942. Iron and steel use in making caskets, shipping cases and burial vaults cut 25% in April, 50% in May, 75% in June from average 1940 rate, not counting 10 pounds allowed per casket, case or vault for hardware or fastenings. All use of other metals, except gold and silver, banned immediately. Iron and steel use permitted after June 30 only for hardware and metal liners.

L-65: Domestic Electrical Appliances, effective March 30, 1942. Until May 31, 1942, production permitted up to 25% of total 1941 output, provided appliances do not contain more than 15% by weight of electrical resistance material used in 1941. Production after May 31 limited to orders with A-2 rating or higher. Effective immediately, start of processing of pig tin, alloy steel, aluminum, copper or copper alloy banned. Nickel not permitted for plating after March 31. Making of replacement parts not restricted.

L-67: Lawn Mowers, effective March 30, 1942. Use of iron and steel in making mowers, except those for cutting crops, in second quarter limited to 50% of amount used in corresponding 1941 period or 50% of average quarterly use in 1941. Production banned after June 30, 1942.

L-73: Metal Office Supplies, effective March 28, 1942. Except for wire staples, iron and steel use each quarter limited to 12½% to 25% depending on product, of weight of all metals used in 1940. Use of any copper, tin, nickel chromium, cadmium or crude rubber prohibited unless processing started. Zinc use limited to galvanizing necessary for practicable use. Manufacturers must follow federal specifications issued by Director of Procurement.

L-78: Fluorescent Lighting Fixtures, effective April 2, 1942. Prohibits manufacture or assembly of fixtures or parts except on orders rated A-2 or better, except that assembly of parts made entirely from materials acquired by an A-2 rating or through rating assigned by Production Requirements Plan permitted. Effective June 1 sales, except for repair parts, limited to orders rated A-2 or better.

Columbia's Beautiful Scrap Drive

PITTSBURG, CALIF.: Citizens of this community, home of the West's largest steel mill, staged a "Scrap for Victory Week" (March 30-April 5) in which Columbia Steel Co. joined heartily. Looking over the scrap situation in Columbia's yard are two volunteer workers in the campaign. Columbia paid ceiling prices; California Scrap Iron Corp. serviced the material at cost, all money over that item going to Red Cross and Boy Scouts. Similar campaigns are under way in nearby cities

L-80: Outboard Motors, effective March 27, 1942. Halts production except for specified government agencies. Output of spare parts limited to 75% of 1941 rate. Manufacturers' stocks of motors of 6 horsepower and more frozen for disposition to government.

L-81: Toys and Games, April 1, 1942. During second quarter in making items containing by weight more than 7% of iron, steel, zinc or rayon, consumption of such materials limited to 25% of average quarterly use in 1941. All use banned after June 30, 1942. Effective immediately, no "Prohibited Materials", including among others alloy steels, chromium plating, copper and silk, may be used if in raw form.

PRICE SCHEDULES

No. 4 (Amendment): **Iron and Steel Scrap,** effective March 31, 1942. Revises extra for chemical borings to $5 for all uses. Establishes following premiums: High manganese steel for electric furnace use, $7 over No. 1 steel; machine and shoveling turnings, $4 when briquetted; mixed cast iron borings and turnings, $3 when briquetted; railroad steel axles for rerolling or reforging, $6 above No. 1 steel; steel wheels and springs for electric furnace, acid open-hearth or foundry use, $3.50 above No. 1 steel; couplers and knuckles, $3 above No. 1 steel. Brake shoes from dealer's yard priced $4.75 under No. 1 cupola cast. Unprepared railroad scrap prices $3.50 less than prepared.

No. 6 (Amendment): **Iron and Steel Products,** effective March 25, 1942. Provides for filing of petition by producers seeking exception from ceiling prices established by schedule, in accordance with Procedural Regulation No. 1 issued by OPA.

No. 17 (Amendment): **Pig Tin,** effective March 30, 1942. Provides following premiums over maximum prices on export sales: 1c per lb. on 11,200 lbs. or more; 1½c on 2240-11,199 lbs.; 2c on less than 2240 lbs. Cost of packaging and other legitimate charges may be added.

No. 46 (Amendment): **Relaying Rails,** effective March 31, 1942. Permits L. B. Foster Co. Inc., New York, to sell 300 tons of relaying rails at $42.50 per gross ton, Port Newark, N. J.

No. 49 (Amendment): **Steel Products at Resale,** effective March 28, 1942. Per-

(Please turn to Page 136)

Windows of WASHINGTON

WPB warns punitive provisions of Second War Powers Act will be applied to violators of priorities regulations . . . Price schedule for resales of iron and steel products amended to eliminate hardships to warehouses . . . New zinc order to be issued soon . . . Inventory of rough diamonds under way . . . Manufacture of outboard motors halted, industry to be converted to production of arms

By L. M. LAMM
Washington Editor, STEEL

WASHINGTON

WHILE WPB is relying on voluntary support of the war production program by industry, it is prepared to use the punitive provisions of the Second War Powers Act swiftly and without hesitation whenever necessary to insure compliance with WPB regulations, including all priorities rules and orders, according to James S. Knowlson, Director of Industry Operations.

Mr. Knowlson said:

"A story published in New York attributes to Sydney Hogerton, district manager for the Bureau of Priorities, a statement that the penalties of the Second War Powers Act will probably be seldom invoked in the New York area and that the chances of these penalties being imposed in New York are extremely slight.

"I assume that this report is the result of a misunderstanding. We have no reason to believe that there will be many violations, and we have every reason to hope that we will continue to enjoy the voluntary cooperation of industry. However, the WPB specifically supported the penalty provisions of the Second War Powers Act and did so because the old penalties which could be imposed on priorities violators were weak and insufficient.

"Now that these penalties are available, they will be used when necessary.

"This does not represent any change of policy by the WPB. Violations clearly resulting from honest mistakes have not been punished in the past, nor will they be punished in the future. But willful violations of priorities orders cannot be tolerated in a war economy and every such case will be vigorously dealt with.

"No one need think that we will hesitate to invoke the powers of the Second War Powers Act whenever this is appropriate and necessary. We must have compliance—all the way. Any statement to the effect that our policy will be not to invoke these powers is misleading."

The Second War Powers Act provides penalties of up to $10,000 fine and one year's imprisonment for each violation of WPB regulations or orders.

Steel Warehouses Aided by Price Schedule Amendments

Several major changes in the price schedule for resale of iron and steel products have been ordered by OPA to facilitate warehouse and jobber operations and to eliminate hardship caused by higher costs in some lines.

The changes, applying to 25,000 dealers, jobbers and distributors of iron and steel products are contained in amendment 2 to Revised Price Schedule No. 49. (See page 59 for other changes in the schedule, announced earlier in the week.)

Under the amendment, sellers of merchant wire products—such as screen wire, poultry wire, barbed wire, and fence—are allowed at least a 20 per cent selling mark-up over the mill carload delivered price. Previously the resale price was held at the level of April 16, 1941. OPA found that in a number of cases the April 16 price was no longer a fair price since it had been based on competitive mill discounts available at that time which are not now generally available.

The amendment also establishes new freight allowances for heavy steel sold on the Pacific coast to reflect withdrawal of inter-coastal steamers for war use and resultant higher costs for all-rail shipments from the East.

Simplification of regulations covering the keeping of records, filing of appeals, and the definition of "mixed carload" are among other matters covered by the amendment.

A summary of principal points follows:

1. A jobber, in determining the selling price for merchant wire, may use the higher of two figures; (a) selling prices on April 16, 1941, as established in the schedule, or (b) 20 per cent above the mill carload price to him.

The 20 per cent mark-up is the approximate figure upon which several applications for relief have been based and on which OPA has acted in granting relief in some individual cases. OPA said it would make further studies but that "the 20 per cent mark-up represents, rather than a ceiling, a floor beneath which April 16 prices need not fall."

2. The Pacific coast provisions of the schedule have been amended to reflect changes in ocean shipping and more complete information on all-rail shipments from the East since the price schedule was adopted last December.

3. In simplifying administrative procedure, OPA directed that only sellers covered by the price schedule need file reports; redefined "mixed carloads" to conform more closely to usage in the industry; and established a maximum price for inventory held by a manufacturer who is unable to use it because of curtailment of product by governmental order.

OPA warned that jobbers who maintain they are retailers to obtain exemptions from the schedule must be prepared to demonstrate they have customarily been engaged in retail business.

Inventories of Unit Heaters, Ventilators, Convectors Frozen

Inventories of unit heaters, unit ventilators, convectors, and blast heating coils have been frozen in the hands of manufacturers by WPB.

Freezing of stocks, and the direction of their distribution to war uses only, is necessitated by the restrictions on the use of materials containing copper and the fact that substitute materials will not

United Speed and Action with Conomatics

Rear view of a 1¼" 6 spindle Conomatic, showing tooling set-up for machining a fuse body.
Front view of a 1¼" 6 spindle Conomatic, showing tooling set-up for machining a fuse body.
With NOW in particulars and catalog.
CONOMATIC
Front view of a 6 spindle Conomatic

Cone AUTOMATIC MACHINE CO., INC.

WINDSOR, VERMONT, U. S. A.

be available in sufficient quantity for some time.

Order bars shipment except on specific approval by WPB. Applications for such approval are to be granted only for shipments to the Army or Navy, certain other designated governmental agencies, for lend-lease purposes, or for industrial plants making products the completion of which is essential to the war effort.

Tin Ceiling Prices Revised To Permit Premiums on Export Sales

Premium over the maximum prices permitted under Revised Price Schedule No. 17 will be allowed on export sales of pig tin under Amendment No. 1, OPA stated last week.

Under the amendment, in the case of export pig tin sales, in addition to the maximum price set in the schedule, the following premiums may be added: 11,200 pounds or more, 1c per pound; 2240 to 11,199 pounds, 1½c per pound; less than 2240 pounds, 2c per pound.

Where the export shipment requires packaging of pig tin, the actual cost to the exporter of such packaging may be added to the maximum price.

Maximum Price on Leaded Zinc Oxides To Be Raised to 7 Cents

Producers of zinc oxides will be asked soon to enter into new voluntary agreements with the OPA, increasing the maximum permissible price on leaded zinc oxides containing 35 per cent or more lead to 7 cents per pound.

Voluntary agreements originally were reached with these producers, effective Jan. 1, 1942, approving a price of 6.75 cents per pound for leaded zinc oxides containing 35 per cent or more lead delivered in bags in carload lots.

However, the price of lead has been raised, since then, with OPA approval. This has increased producers' costs of this oxide, which is used principally in paints. The advance in prices creates a more equitable relationship between prices for the several grades of oxide.

Revised Zinc Order Pends; Pool Requirements Raised

Pending completion of a revised zinc order, General Preference Order M-11, under which the zinc pool is operated, has been extended to May 31. It was scheduled to expire March 31.

April zinc pool has been established at 60 per cent of January production for high-grade and special grades. March pool was 50 per cent of December output. April pool for all other grades will be 40 per cent of January production. No zinc oxide or zinc dust is required for the pool.

Drill Chucks Excluded From Revised Order E-1-a

WPB has revised General Preference Order E-1-a to exclude drill chucks from the types of chucks controlled by the order. No purchase order received after March 25, 1942, for any machine tool shall be given priority standing in production and delivery schedules unless a preference rating has been assigned to it by a PD-1A, or PD-3A Preference Rating Certificate or Preference Rating Order P-19-h.

Delivery of the preference rating certificate itself to the producer is no longer required, but each purchase order must carry the proper endorsement prescribed by PD-1A, PD-3A or P-19-h.

Purchase orders for gages and chucks, the WPB stated, shall be scheduled only upon receipt of a preference rating assigned to them by a preference rating certificate, or by any preference rating order of the P-series, except Nos. P-90 and P-100.

Inventory of Rough Diamonds To Be Made by War Board

Nationwide inventory of rough diamonds, used in making machine tools and for numerous other phases of the war effort, has been announced by WPB.

Conservation Order M-109 provides that all persons, who, on March 31, had in their possession or had title to 10 carats or more of rough diamonds must report them to the WPB by April 15. Subsequent reports must be made quarterly. Form PD-376 is provided for this purpose.

Outboard Motor Output Banned; Industry To Make War Materials

Production of all outboard motors except for defense orders, is prohibited by WPB in Order L-80. Stocks of all outboard motors of 6-horsepower and over in the hands of manufacturers have been frozen.

The freeze order does not apply to motors under 6-horsepower in the hands of manufacturers, nor does it apply to motors of any size in the hands of distributors or dealers.

Order permits continued manufacture of repair and replacement parts up to 75 per cent of a manufacturer's average monthly production of such parts in 1941.

Outboard motors are made largely of aluminum and steel. In 1941 some 150,000 such motors were manufactured, consuming approximately 4,000,000 pounds of aluminum, 3,000,000 pounds of steel, and 1,000,000 pounds of copper and copper base alloy.

All the motors have been manufactured by seven companies, located in the Middle West area. In 1941 they did a business of between $16,000,000 and $18,000,000. All of the companies are already engaged in some direct war production and within a short time almost their entire capacity will be devoted to such work. One company already has $17,000,000 worth of war orders.

OPA Permits Increases in Petroleum Products Prices

Military demands for a substantial and rapid increase in production of Pennsylvania grade crude oil has caused the issuance by OPA of Amendment No. 3 to Revised Price Schedule No. 88, permitting an increase of 25 cents a barrel for all grades. A second advance of like amount also has been assured when production reaches 85,000 barrels per day average over a three-month period.

Another amendment recognized the higher transportation costs involved in using railroad tank cars instead of ocean tankers to haul petroleum products to the Eastern seaboard. Maximum prices on gasoline were raised one-half cent a gallon; on distillate fuel oils 0.4-cent a gallon; residual fuel oils, 20 cents a barrel. Higher prices apply in 17 eastern and southern states and the District of Columbia.

Coal Dealers Allowed To Add Freight Increase to Prices

Wholesale and retail coal dealers will be permitted to add to their prices for coal and domestic coke the exact amount of freight rate increase actually incurred by them as a result of the recent freight rate advances granted to the railroads by the Interstate Commerce Commission.

Increased freight rates on coal amount to 3 cents per net ton, when the previous rate was $1 a net ton or less, and 5 cents per net ton when the previous freight rate was more than $1. Similar increases on a gross ton basis, amounting to 4 and 6 cents per gross ton, also were provided under the ICC ruling on ten days' notice by the carriers, and have since been put into effect.

Wholesale and retail coal dealers, on request of OPA, have been maintaining the price levels prevailing during the period Dec. 15-31, 1941. The additions to cover increased freight charges actually incurred may be added to those levels. However, OPA strongly urges all retail and wholesale dealers to absorb these freight increases.

Mandatory Control Over Pig Iron Extended; Reserve Pool Eliminated

WASHINGTON

INCREASING shortage of pig iron has prompted WPB to issue Amendment No. 2 and Extension No. 2 to General Preference Order M-17, completely allocating pig iron supplies.

Amendment eliminates the reserve tonnage pool and, instead, places all tonnage produced under mandatory control. Steel companies that produce and use their own pig iron are required to report priority ratings on their production schedules.

Pig iron buyers are required to fill out Form PD-69 by the fifth day of the month before they purchase pig iron. By the same date buyers must file reports on Form PD-70 with the WPB, showing inventories and pig iron consumption.

Producers of pig iron must file reports on orders, schedules, and shipments by the 12th day of each month hereafter. Producers may ship pig iron only in accordance with delivery schedules filed on Form PD-71, as approved or modified by the Director of Industry Operations.

The pig iron order has also been extended to remain in effect until revoked.

Home Electrical Appliances Production Banned by WPB

Manufacturers of electrical appliances have been ordered to discontinue at once the use of certain critical materials in the manufacture of a long list of home electrical appliances.

Between now and May 31 the manufacturers, some 200 concerns employing between 20,000 and 25,000, that normally produced approximately $60,000,000 worth of appliances annually, may produce appliances at a rate of approximately one and a half times their rate of production in 1941, though without the use of critical materials prohibited.

After May 31 they must halt production of all appliances except to fill orders or contracts bearing preference ratings higher than A-2.

Production of replacement parts is not affected.

The WPB order (L-65) affects such common household appliances as electric toasters, waffle irons, flat irons, roasters, grills, table stoves, portable heaters, food mixers, juice extractors, percolators, dishwashing equipment, dry shavers, hair dryers, permanent wave equipment, hair clippers, cigar and cigarette lighters, and heating units for new electric ranges, water heaters, and domestic radiating heaters.

It does not apply to the following: laundry equipment, vacuum cleaners, refrigerating and air conditioning equipment, commercial dishwashing equipment, fans and electric heating pads, record-players, oil furnaces, vending and gaming machines, and other electrical items not customarily classified as domestic or commercial electrical appliances. For the most part these items are covered by orders previously issued or by orders about to be issued.

WPB To Halt Copper Allocations For Rural Electrification

WPB has notified the Rural Electrification Administration that only 100 additional tons of copper will be allotted to it to complete projects already under way.

This copper and supplies on hand must be used to complete projects which were more than 40 per cent complete last Dec. 5, and a few additional projects designated by REA and approved by the WPB Power Branch.

Last December the former SPAB authorized the then OPM to allocate to REA 1500 tons of copper per month up to a total of not more than 10,500 tons. It provided that such copper should be used on certain projects listed in two groups that were then more than 40 per cent complete. It provided also that projects less than 40 per cent complete should be reviewed, and those substantially under way should be completed.

REA has since then received a total of 7200 tons of copper. While 3300 tons short of the maximum permitted under the SPAB policy, the copper situation has become even more acute than it was last December and the WPB has declined further allocations.

Allocation of Semifinished Steel For Seamless Tubing Halted

To assure maximum steel usage in the direct war effort, semifinished steel will no longer be allocated to manufacturers of seamless tubing who do not make their own steel.

Instead, manufacturers of this type must rely in the future on the use of priority ratings, except in cases where the tubing itself is allocated.

Nonintegrated producers of steel sheets and pipe who have been buying semifinished steel from integrated manufacturers, must also rely on priority ratings in the future.

Decision was announced in a telegram to all manufacturers signed by the WPB, which read:

"Allocations of tube rounds and billets for the manufacture of carbon and alloy steel seamless tubing is discontinued, except where the tubing itself is allocated. Service from your sources of supply will depend upon ratings applicable to your orders. You will be required to extend ratings to your sources or file Form PD-25A to determine applicable ratings under Production Requirements Plan."

Nail Manufacturers Asked To Increase Production

Because lumber is largely replacing steel in wartime building construction, nail manufacturers have been asked to increase production during coming months.

Twenty-six common nail manufacturers have been authorized by WPB to produce a total of 72,000 tons of nails a month during April, May, June and July.

Nail production averaged 55,000 tons a month in 1940 and had climbed to 65,000 tons a month by 1941.

Nail manufacturers have been directed to sell their products only on orders carrying preference ratings. Large consumers buy a portion of the output directly from manufacturers, but jobbers still distribute a large percentage of total production.

Use of Critical Materials in Flashlights, Batteries Limited

Use of most of the critical materials in flashlights has been prohibited by the WPB in Limitation Order L-71.

Effective immediately, not one pound of aluminum, crude rubber, chromium, or nickel may be used in the production of flashlight cases or batteries. Tin may be used only in solder. Brass and copper may be used only in the minimum quantities necessary to provide electrical contact fittings.

The restriction will be extended to iron and steel on May 31. After that date iron and steel may be used only in reflectors, contact fittings, battery top seals, battery outer jackets, eyelets, rivets, and end caps or end ferrules.

Materials permitted under the order may not be used in greater quantity (by weight) than was used during 1940, with provision made for manufacturers who have used substitute material in flashlights and batteries since Dec. 31, 1940.

Only critical material not prohibited or sharply restricted by the order is zinc.

Increased Domestic Output of Vital Minerals Effected by RFC Agencies

WASHINGTON

LARGE increases in the domestic production of critical and strategic materials, including bauxite, chrome, manganese, tungsten and vanadium, have been effected by the Metals Reserve Co. in co-operation with the Reconstruction Finance Corp. and Defense Plant Corp.

Details of progress by the RFC subsidiary were reported to Federal Loan Administrator Jesse H. Jones last week by Charles B. Henderson, president, MRC.

Mr. Henderson also reported that necessary increases in zinc smelting capacity have been made; substantial increases in copper production have been made through the larger producers.

Numerous and important small producers of the major nonferrous metals have been stimulated by arrangements for the payment of premiums over the OPA ceiling prices.

Details of the program follow:

ALUMINUM AND BAUXITE: In Arkansas, contracts have been made with American Cyanamid & Chemical Corp. and with Reynolds Mining Co. for production of 540,000 and 300,000 long tons per annum, respectively, of low-grade bauxite. Republic Mining & Mfg. Co., a subsidiary of Aluminum Co. of America, is proceeding with stripping operations preliminary to increased production, and with several small producers will supply the balance of approximately 840,000 long tons per annum required for the billion-pound alumina plant now under construction in Arkansas. Plans are proceeding for possible increase in production of high-grade bauxite in Arkansas to 2,000,000 long tons per annum, and for stockpiling any excess of current production over consumption. The above program represents a total increase of approximately 200 per cent over 1941 domestic production of bauxite, and is scheduled to keep pace with increasing requirements for aluminum.

Antimony Program Broadens

ANTIMONY: In Idaho, negotiations are in process with Sunshine Mining Co. for a metal contract in connection with expansion of production at its new property from 30,000 pounds to 150,000 pounds of antimony per month. Discussions are proceeding with the Bradley Mining Co. for possible production from the large low-grade antimony deposit surrounding its rich tungsten mine.

In Texas, contracts made with the Texas Mining & Smelting Co. have permitted that company to make a large increase in imports of Mexican antimony ores, for metal production in Texas.

Domestic production of antimony continues to supply only a small proportion of domestic needs.

CADMIUM: Increase in facilities for electrolytic zinc production being made in Montana and Missouri, will permit the recovery of substantial amounts of cadmium contained in zinc concentrates.

CHROME: In Alaska, a contract has been made for delivery of 20,000 tons of high-grade ore during the summer of 1942. Co-operation has been extended to the same producer for production of 400 to 500 tons per day of milling grade ore, and arrangements made to mill this tonnage in Alaska.

In California, The Grey Eagle mill in Glenn county started operations in March, 1942, under arrangement with RFC and Metals Reserve Co., at the rate of 15,000 tons of metallurgical grade concentrates per annum.

To Buy in Truck Lots

Arrangements have been made for purchase of chrome ores from small operators in truck-load lots from the numerous small chrome deposits of northern California and southern Oregon. Stockpiles and sampling facilities will be available at numerous locations in this relatively inaccessible area.

In Montana, a major development and production program is being carried out by Defense Plant Corp. and Metals Reserve Co., with Anaconda Copper Mining Co. in charge of construction and operations. One mill went into operation March 1, 1942, on a basis of 60,000 short tons of concentrates per annum, and plans are underway for increasing present capacity by 150 per cent before the end of 1942. Another mill is expected to be in operation before the end of this year on a basis of 150,000 tons of concentrates per annum, with the possibility of further increase in capacity in 1943. Still another property is expected to be in production at the rate of 60,000 tons per annum by the end of 1942. Prospecting and development of other areas will be carried forward this year as soon as weather permits. This production rate of 360,000 short tons per annum from those three Montana properties alone by the end of 1942 compares with the previous peak United States production figure of 92,400 short tons, achieved in 1918.

In Oregon, a mill for recovering chromite from bench gravels is well under way, under contract to deliver 30,000 tons of chemical grade concentrates per annum to Metals Reserve Co.

Arrangements have been made for erection of a 400-ton mill in Wyoming by private interests involving production of 35,000 tons of concentrates per annum under contract with Metals Reserve Co.

COPPER: At the request of the WPB, Metals Reserve Co. has agreed to pay a premium of five cents per pound for "over-quota" production of domestic copper. It is expected that this will enable some mines to operate which could not operate profitably at the ceiling price of twelve cents per pound, and will permit numerous small individual operators to expand their production greatly.

Arrangements have been made for expansion of domestic copper production as follows:

	Production Tons Per Year
Bagdad Copper Co.	10,200
Calumet & Hecla Consolidated Copper Co.	1,250
Gray Eagle Mining Co.	6,800
Miami Copper Co. (DPC)	23,000
National Tunnel & Mines Co.	5,000
Phelps Dodge Corp. (DPC)	60,000
Total	106,250

The government has made capital commitments totaling $39,000,000 to effect this expansion.

The aggregate increase in domestic copper production may well be 200,000 tons per annum.

GRAPHITE: RFC loans have been granted to the four principal producers in the Alabama, Texas and Pennsylvania fields, and further investigations are under way in Chester county, Pennsylvania.

LEAD: Arrangements have been made to pay a premium of 2¾ cents per pound on over-quota production of lead, for a period of two and one-half years from Feb. 1, 1942. Substantial stimulation of small mine production may be expected to result from the premium price of 9.25 cents per pound, which is in excess of the highest average price level for lead in fifty years.

MANGANESE: Owners of the Major portion of the large manganese reserves in Arizona are carrying out experimental work in a large pilot plant, and will submit preliminary plant designs and cost estimates with the view of entering into the necessary contracts with Defense Plant Corp. and Metals Reserve Co. to bring this large property into production.

In Arkansas, arrangements are being made for construction of a

concentrating plant of 300 to 500 tons daily capacity.

In Minnesota, production of manganese from the "black ores" of the Cuyuna Range has been dependent upon the satisfactory solution of the metallurgical problems involved. After six months of pilot plant operation conducted under the auspices of Metals Reserve Co., it has been decided to use sulphuric acid leaching for this ore. Negotiations are proceeding for erection and operation of plant and for ore delivery for a plant of 200,000 tons per annum of 60 per cent manganese nodules.

Anaconda Output Gains

Anaconda Copper Mining Co. is now producing for Metals Reserve Co. high-grade manganese nodules (60%Mn) from its benefication plant in Montana at the rate of 112,000 short tons per annum, and is making plans for increased production under its contracts to deliver to Metals Reserve Co. Arrangements are being made for construction of a concentrating plant in the Phillipsburg area.

At the Three Kids property in Nevada, Manganese Ore Co. is proceeding to erect and operate a leaching plant under contracts with Defense Plant Corp. and Metals Reserve Co. This property should be in production before the end of 1942 at a rate of 110,000 short tons per annum of high-grade sinter (63% Mn), at an expenditure for milling facilities by Defense Plant Corp. of approximately $5,500,000, and of $2,250,000 by Manganese Ore Co. for property, mining facilities and preliminary stripping. It is expected that the above facilities may be expanded in 1943.

Arrangements are being made to provide milling facilities for the manganese deposit in other Nevada areas.

One company is now operating a small mill in New Mexico, and a second company designing a mill of 250-300 tons daily capacity. Both of these companies have contracts with Metals Reserve Co. for sale of their production.

Problems of the great low-grade Chamberlain deposit in South Dakota are (1) the recovery of nodules from the shales of the district, and (2) the conversion of these nodules into ferromanganese. For the first problem, steps are being taken to produce approximately 300,000 tons of 16 per cent nodules per annum, which will either be stockpiled for the present, or blended with high-grade concentrates if required.

Metals Reserve Company has concluded a contract with the owner of the principal Utah ore area, who proposes to erect his own concentrating mill.

In addition to the above, Metals Reserve Co. has made 50 contracts for manganese production in 13 states.

MERCURY: Production of mercury has increased so rapidly both in the United States and Mexico under stimulation of price that no steps have been taken, nor are contemplated at the present time, for any substantial government financing.

MICA: A program is being evolved for establishment of buying offices in the principal producing centers of the domestic mica industry.

TUNGSTEN: Contracts have been made with three of the largest domestic producers of tungsten to permit substantial increase in their production, and similar contracts are being arranged with numerous other producers. A retreatment plant will be erected this spring in Utah which will permit the utilization of large tonnages of low-grade concentrates, much of which has hitherto not been recovered. Arrangements are being made for direct purchase of production from small producers. With the stimulation of a price of $24 per unit (of 20 pounds) and of the above measures, it is expected that domestic tungsten production will increase from approximately 6500 tons in 1941 to a rate of approximately 19,500 tons by the end of 1942.

Vanadium Development

VANADIUM: Arrangements have been completed for the rapid development of several of the lead vanadate properties in the West, which were of no economic interest under normal conditions. A program is being developed for increasing the production of vanadium from the sandstone ores of western Colorado and eastern Utah. These two steps should result in an increase of about 60 per cent in domestic vanadium production as compared with 1941.

ZINC: Expansion of domestic zinc smelting facilities has been effected by Metals Reserve Co. through contracts for the purchase of production or through agreements to make the necessary concentrate productions available, on the following projects:

	Added Capacity Short Tons
American Smelting & Refining Co.	25,000
American Zinc, Lead & Smelting Co.	20,000
Anaconda Copper Mining Co.	45,000
United Zinc Smelting Co.	14,400
Total	94,400

Government's commitment totals $5,250,000.

Through arrangements for continued supplies from foreign sources and through stimulus to domestic zinc production by the payment of a premium of 2¾ cents per pound for "over-quota" production, concentrate supplies should be adequate to utilize existing smelter facilities and those made available by the program outlined above.

Windows Taped To Prevent Splintering, Sell War Bonds

TAPING the windows of its main office building to prevent splintering in event of an air raid, Columbian Steel Tank Co., Kansas City, Mo., worked in an ingenious sales promotion campaign for Uncle Sam with the slogan "Buy Stamps and Bonds." The taped design shown is on a window measuring 7 feet, 9 inches by 16 feet, 8 inches. Tape, ½-inch, 1 and 2 inches in width, was used

A MESSAGE TO THE AUTOMOTIVE INDUSTRY

A year ago these Bullard Mult-Au-Matics were turning out automotive parts in a well known Detroit plant. Today, with minor tooling changes, they are machining shells. Some day they will be back on automotive parts again.

As the automotive industry shifts to armament production, it is receiving significant proof that the versatility of Bullard Mult-Au-Matics on any kind of job within their capacity makes for fast, low-cost production. This will be remembered when peace comes.

BULLARD

THE BULLARD COMPANY

BRIDGEPORT, CONNECTICUT

Mirrors of *MOTORDOM*

Posthumous analysis of Reuther plan shows author strong on eloquence but weak on practical knowledge of manufacturing. Plan for building 500 airplanes a day with excess automotive capacity called a political and publicity stunt . . . Japanese rubber via Brazil a possibility? . . . Experts cracking delays and red tape of routine military procedures in connection with procurement . . . Keep engine capacity in reserve

By A. H. ALLEN
Detroit Editor, STEEL

DETROIT

AN EVENT unprecedented in labor-management discussions was the joint conference held here last week before representatives of the press, Army and Navy officers, and government officials by C. E. Wilson, president of General Motors, and Walter Reuther, head of the General Motors division of the United Automobile Workers-CIO, on the subject of the late-lamented Reuther plan for building 500 airplanes a day in the automobile industry.

In many respects the all-day discussion, transcript of which covered 157 typewritten pages, took on the appearance of a wake, since the Reuther plan is now more or less ancient history, having been advanced in the calm days of late 1940, B. C. (Before Conversion). Despite the efforts of Moderator George V. Denny, president of Town Hall Inc., the discussion wandered from the Reuther plan itself, principally toward the question of what labor and management can do in the months immediately ahead to stimulate war production.

The Reuther Plan

Essentially, the Reuther plan was a sketchy suggestion of how to organize excess capacity existing in the motor industry in 1940 and turn it to the production of 500 fighting planes a day. Core of Mr. Reuther's argument was that the plan was only considered typical of how joint labor-management-government councils could speed up war production. Mr. Wilson tried to focus attention on the plan itself and to point out its faults, but Reuther preferred to ignore details and to soar into oratorical flights dealing with broad general principles of giving labor a greater voice in production planning.

From an oratorical standpoint, Mr. Reuther would have to be conceded the victory. He is young, fiery, perfectly at ease before a microphone and never at a loss for words. He is one of the few, if not the only, UAW-CIO official who is logical and clever in his arguments. Mr. Wilson is not at his best speaking before a public gathering, but to anyone who analyzed his contentions and who is familiar with the operations of the motor industry, the soundness of his contentions could not be doubted.

Actually, the Reuther plan can be dismissed with a wave of the hand as far as its practical application is concerned. In the first place it was conceived by a young, inexperienced labor leader who has never operated even a single plant, let alone an industry. In the second place, 500 fighting planes per day of a single type could not be used and are not wanted, even if they could be built. In the third place, spreading their production over scores of plants and then bringing subassemblies together imposes problems which are just impossible of solution. And finally, controlling production by joint industry - labor - government councils is an untried, un-American system which would only result in these councils becoming miniature debating societies while production languished.

It is difficult to draw any clearly defined conclusions from the Wilson-Reuther discussion, but a summary of the 6-hour talkfest suggests that:

1. For labor and management to bring their differences into the open and discuss them is a real American way of doing things. It is a healthy sign.

2. Labor union leaders still are insistent that joint councils constitute the means for giving them more voice in production. They say that they seek no share of management, but in the next breath declare that joint councils are the best way to speed the war effort.

3. Actually, labor relations with management in war plants are generally smooth, and production is going ahead beyond earlier anticipations. Too much publicity is being given to isolated cases of trouble, and none to the overall picture.

4. The Reuther plan as such is interred for good and all the necessary obsequies have now been performed.

5. It is unfortunate that more labor leaders do not sincerely support the concluding statement made by Mr. Reuther: "Neither management nor labor has a monopoly on the job of perfecting and defending democracy. It is a joint job and I hope that we can at least go out of this meeting here today with a feeling that as far as labor is concerned and management, that we are prepared to accept that common responsibility and go down the line together, fighting the common fight, and winning together in the end."

Military Needs Total 500,000 Tons

Expert opinion on the rubber situation here is that present supplies of natural rubber will be exhausted sometime between July and September of 1943. In the past year, shipments, including material in transit at the end of the year, totaled something over 900,000 tons. Military needs for this year are roughly 500,000 tons. Synthetic rubber production for 1941 was about 50,000 tons, will be increased to about 240,000 tons for next year.

It is considered likely there will be some rubber available for normal civilian use—that is, beyond the present rationing limitations—by the end of 1943. Expansion of synthetic rubber production, costing roughly $1000 per ton per year, is an uncertain quantity, and there is considerable doubt announced goals can be achieved.

What appears a distinct possibility is the appearance of some rubber from the Malay peninsula, now

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controlled by the Japanese. The plantations there were in no sense scorched by the retreating British and conceivably Japanese commercial agents could get them into production without too much delay. Such rubber then might be sold to interests in this country by way of an intermediary or broker in, say, Brazil. The Japanese would like to get the money or credit which rubber could supply; and we would like to get the rubber, principally for our military needs. Essentially this would amount to trading with the enemy, but there is plenty of support to the belief that such rubber will find its way into this country before too long.

Stories Are Limitless

Stories of how "normal military procedure" is interfering with accelerating war production are practically limitless. For example, the Army "frank" on rail shipment of material is causing some avoidable delays. Regulations require shipment of certain government purchases by rail and this may mean moving material from the source to the nearest rail terminus by truck, transferring to cars, then transferring to a truck again at the destination for delivery to the buyer. Naturally truck interests are protesting such waste of time, and would seem to have a justifiable complaint.

Slowly such delays and waste motions are giving way to action. Red tape is succumbing to common sense. Hard and fast regulations are relaxing in favor of expediency. Much of the credit for breaking these chains must go to the War Production Board and to its district offices. Experts in all phases of civilian procurement, manufacture, follow-up and shipping are digging into the way these things have to be done according to preconceived military regulations and are cutting through delays in business-like fashion. The trend is heartening.

One effect of this streamlining of both procurement and manufacturing is seen already in private predications that the forecast labor shortage for Detroit is not going to be nearly as serious as first thought. New ideas, new methods, new techniques are releasing manpower for other jobs, so despite the fact that new plant sites in Detroit are now being turned down by the government board in charge of this activity, because of a feared labor shortage, actually these fears are being minimized among expert opinion.

The automobile industry once had capacity for turning out about 23,000 engines a day, which is a lot of horsepower—probably close to 1,150,000. Much of this has been scrapped in the process of converting plants to war production, and this scrapping of potential horsepower has been disturbing to both military and civilian directors of the war effort. They reason that some day a "screwball" inventor may come up with a feasible plan for building hundreds of thousands of small robot planes powered by automobile engines which could be directed by radio into enemy territory where they could be crashed with their bombload. Then a source for mass production of engines would be needed at once and would not be available because of the scrapping of the automobile engine plants.

So it can be taken for granted that a measure of gasoline engine production facilities is being set aside "just in case." Capacity for perhaps 6000-8000 engines a day is being retained, four different plants figuring in the picture—Chevrolet, International Harvester, Ford and Dodge.

Inter-company Co-operation

An indication of the war production now active and being tooled for in the motor industry is given in the figure of $13,000,000,000 which represents the value of a year's production if plants are operated at the capacity now being planned. This breaks down roughly as follows: General Motors, $5,800,000,000; Ford, $3,000,000,000; Chrysler, $1,700,000,000; Nash-Kelvinator, $424,000,000, Studebaker, $245,000,000, and other companies lesser amounts.

An example of inter-company co-operation on war work, now several weeks old, is related by the local branch of the WPB. Ford was at work on an order for 75-millimeter gun mounts, requiring extensive precision machining. Necessary milling machines and lathes could not be delivered before April 1 and ten days were required for getting them tooled. Three milling machines were available at Packard, set aside for a job which starts May 15. So these machines were diverted to Ford, and an order for new millers switched to Packard, where they will arrive in time.

A 24-inch engine lathe not busy on war work was located at Royal Oak Tool Co. so arrangements were made to sell it directly to Ford. Then machine tool capacity for manufacturing gun mount shields was located at Briggs, so this portion of the job was subcontracted. The whole maneuver enabled Ford to multiply by six its output of gun mounts by April 1.

Gun breech housing production at Fisher Body plants has been accelerated sharply and new Navy contracts signed for additional quantities which will step up production two or three times from the present rate.

GM DEBATES WITH ORGANIZED LABOR: Left, C. E. Wilson, president, General Motors; right, Walter Reuther, head of General Motors division of the UAW-CIO. Center, George V. Denny, president, Town Hall Inc., acting as moderator. Corporation and union executives also were seated at the table with the principals, corporation on left and union on right. Audience consisted of 75 press representatives. For highlights of day-long debate read accompanying article

Tires To Be Available for Heavy Off-the-Road Vehicles

WPB has modified truck production restrictions so that tires and tubes will be made available for heavy off-the-highway vehicles designed to transport materials on mining, construction, logging or petroleum development projects.

Manufacturers have been told that vehicles weighing 24,000 pounds or more and produced under March production quotas may be equipped with tires and tubes, if they are designed for use on the projects specified.

J&L STEEL

JONES & LAUGHLIN
STEEL CORPORATION
AMERICAN IRON AND STEEL WORKS
PITTSBURGH, PENNSYLVANIA

SPECIAL
COLD DRAWN SHAPES
SAVE MACHINING

Two Months Steel for Sale 10,673,019 Tons

Production of steel for sale in the first two months this year totaled 10,673,019 net tons, compared with 10,028,354 tons in the corresponding period last year, according to the American Iron and Steel Institute, New York.

Output in February was 5,097,353 tons, 478,313 tons less than 5,575,666 tons in January, longer month. In February, 1941, production was 4,864,936 tons, 232,417 tons less than this year. Tonnage shipped to other members of the industry for further conversion in February totaled 335,523 tons, compared with 411,041 tons in January, 746,564 tons for two months. In two months last year the figure was 578,851 tons.

Production rates in February were high, in several products exceeding rated capacity. Black plate output was at 217.6 per cent of theoretical capacity; plates 134.8 per cent; steel piling 112.3 per cent. Products reaching close to capacity were steel bars 92.4 per cent; tool steel bars 88.4 per cent; drawn wire 89 per cent; hot-rolled tin plate 92.6 per cent.

Steel plate output in February was 734,656 tons, compared with 713,182 tons in January. It was 76 per cent more than 417,637 tons made in February, 1941. Much of the plate tonnage was at the expense of sheets and strip, of which 995,414 tons was made in February, nearly 26 per cent less than 1,343,266 tons in February last year. In January sheet and strip output was 1,162,304 tons.

Details for February and two months are shown in the accompanying tabulation. The figures represent 193 companies, which in 1940 made 98 per cent of total output of finished rolled products.

AMERICAN IRON AND STEEL INSTITUTE
Capacity and Production for Sale of Iron and Steel Products

February - 1942
(revised)

		Number of companies	Items	Annual Capacity Net tons (a)	Production for Sale—Net Tons: Current Month: Total	Current Month: Per cent of capacity	Current Month: Shipments: Export *	Current Month: Shipments: To members of the industry for conversion into further finished products	Year to Date: Total	Year to Date: Per Cent of capacity	Year to Date: Shipments: Export *	Year to Date: Shipments: To members of the industry for conversion into further finished products
Steel Products	Ingots, blooms, billets, slabs, sheet bars, etc.	43	1	xxxxxxx	389,817	xxx		162,301	1,189,161	xxx		334,188
	Heavy structural shapes	9	2	5,055,580	354,283	91.3		xxxxxxx	757,857	92.7		xxxxxxx
	Steel piling	4	3	374,000	32,221	112.3		xxxxxxx	70,319	116.3		xxxxxxx
	Plates—Sheared and Universal	20	4	7,101,320	734,656	134.8		9,079	1,447,763	126.1		22,459
	Skelp	7	5	xxxxxxx	69,195	xxx		34,347	152,475	xxx		87,952
	Rails—Standard (over 60 lbs.)	4	6	3,509,260	107,639	40.0		xxxxxxx	230,901	40.7		xxxxxxx
	Light (60 lbs. and under)	6	7	309,690	13,221	55.6		xxxxxxx	21,240	42.4		xxxxxxx
	All other (Incl. girder, guard, etc.)	2	8	102,000	1,313	16.8		xxxxxxx	2,673	16.2		xxxxxxx
	Splice bar and tie plates	12	9	1,108,270	43,282	50.9		xxxxxxx	97,338	54.3		xxxxxxx
	Bars—Merchant	42	10	xxxxxxx	545,362	xxx		60,028	1,140,089	xxx		141,846
	Concrete reinforcing—New billet	18	11	xxxxxxx	138,600	xxx		xxxxxxx	301,088	xxx		xxxxxxx
	Rerolling	17	12	xxxxxxx	13,693	xxx		xxxxxxx	32,553	xxx		xxxxxxx
	Cold finished—Carbon	23	13	xxxxxxx	98,286	xxx		xxxxxxx	209,831	xxx		xxxxxxx
	Alloy—Hot rolled	17	14	xxxxxxx	148,992	xxx		25,276	296,806	xxx		56,622
	Cold finished	16	15	xxxxxxx	17,369	xxx		xxxxxxx	35,939	xxx		xxxxxxx
	Hoops and baling bands	4	16	xxxxxxx	7,270	xxx		xxxxxxx	13,406	xxx		xxxxxxx
	TOTAL BARS	64	17	13,680,180	969,572	92.4		85,304	2,029,712	91.8		198,468
	Tool steel bars (rolled and forged)	15	18	188,820	12,802	88.4		xxxxxxx	25,316	82.9		xxxxxxx
	Pipe and tube—B. W.	16	19	2,227,040	133,786	78.3		xxxxxxx	271,531	75.4		xxxxxxx
	L. W.	8	20	904,400	35,684	51.4		xxxxxxx	77,398	52.9		xxxxxxx
	Electric weld	7	21	1,165,450	42,929	48.0		xxxxxxx	99,260	52.7		xxxxxxx
	Seamless	14	22	3,031,160	164,052	70.5		xxxxxxx	326,617	66.6		xxxxxxx
	Conduit	8	23	186,280	11,876	83.1		xxxxxxx	26,668	88.5		xxxxxxx
	Mechanical Tubing	10	24	402,600	30,421	98.5		xxxxxxx	63,579	97.7		xxxxxxx
	Wire rods	21	25	xxxxxxx	98,954	xxx		13,581	211,818	xxx		31,171
	Wire—Drawn	42	26	2,338,090	159,726	89.0		2,516	360,438	95.3		6,174
	Nails and staples	19	27	1,152,170	58,391	66.1		xxxxxxx	119,869	64.3		xxxxxxx
	Barbed and twisted	13	28	461,270	24,415	69.0		xxxxxxx	51,081	68.5		xxxxxxx
	Woven wire fence	16	29	766,485	17,398	29.6		xxxxxxx	37,498	30.3		xxxxxxx
	Bale ties	11	30	114,910	6,335	71.9		xxxxxxx	11,815	63.6		xxxxxxx
	All other wire products	9	31	71,020	3,223	59.1		xxxxxxx	6,326	55.1		xxxxxxx
	Fence posts	12	32	120,185	3,896	42.3		xxxxxxx	7,638	39.3		xxxxxxx
	Black plate	11	33	342,100	57,114	217.6		-	107,583	194.5		-
	Tin plate—Hot rolled	6	34	508,620	36,148	92.6		xxxxxxx	73,496	89.4		xxxxxxx
	Cold reduced	11	35	3,871,340	224,679	75.6		xxxxxxx	504,520	80.6		xxxxxxx
	Sheets—Hot rolled	28	36	xxxxxxx	470,710	xxx		13,662	1,022,453	xxx		34,663
	Galvanized	15	37	xxxxxxx	102,771	xxx		xxxxxxx	214,100	xxx		xxxxxxx
	Cold rolled	16	38	xxxxxxx	157,836	xxx		xxxxxxx	359,009	xxx		xxxxxxx
	All other	13	39	xxxxxxx	46,985	xxx		xxxxxxx	94,851	xxx		xxxxxxx
	TOTAL SHEETS	30	40	13,098,250	778,302	77.5		13,662	1,690,413	79.8		34,663
	Strip—Hot rolled	25	41	2,924,340	134,145	59.8		14,733	286,473	60.6		31,489
	Cold rolled	40	42	1,605,840	82,967	67.3		xxxxxxx	183,327	70.6		xxxxxxx
	Wheels (car, rolled steel)	5	43	424,820	22,667	69.5		xxxxxxx	44,068	64.2		xxxxxxx
	Axles	6	44	453,470	19,207	55.2		xxxxxxx	39,468	53.8		xxxxxxx
	Track spikes	11	45	320,450	11,226	45.7		xxxxxxx	25,948	50.1		xxxxxxx
	All other	7	46	91,600	11,811	168.1		xxxxxxx	21,432	144.7		xxxxxxx
	TOTAL STEEL PRODUCTS	167	47	xxxxxxx	5,097,353	xxx		335,523	10,673,019	xxx		746,564
	Pig iron, ferro manganese and spiegel	29	48	xxxxxxx	653,999	xxx		234,406	1,583,891	xxx		520,447
	Ingot moulds	5	49	xxxxxxx	68,426	xxx		xxxxxxx	134,107	xxx		xxxxxxx
Iron Products	Bars	12	50	177,115	9,061	66.7		989	19,186	67.0		1,796
	Pipe and tubes	3	51	109,300	6,688	79.8		xxxxxxx	14,277	80.8		xxxxxxx
	All other	1	52	56,000	1,695	39.5		-	3,650	40.3		-
	TOTAL IRON PRODUCTS (ITEMS 50 to 52)	14	53	277,915	17,444	81.3		989	37,113	82.6		1,796

Total number of companies included, 193. During 1940 the companies included above represented 98.0% of the total output of finished rolled products.

(a) To be revised. * In accordance with Government policy, export figures cannot be published.

Steel Resale Price Schedule Relaxed To Free Distressed Stocks

WASHINGTON

TO STIMULATE the flow of iron and steel products into domestic and foreign commerce, OPA has amended Revised Price Schedule No. 49, resale of iron and steel products.

Amendment, directed specifically toward streamlining activity in three hitherto somewhat clogged distributive channels, was evolved by the OPA's export price control committee, working in collaboration with a like committee from the Board of Economic Warfare.

Highlights of the amendment:

1. Inventories acquired before Dec. 15, 1941, effective date of the original schedule, may be sold voluntarily in the export market only at the regular ceiling prices, plus the addition of storage charges, demurrage and similar charges accumulated because of failure to secure shipping space.

The original schedule did not provide for any allowance for storage, demurrage and similar charges.

Where this new maximum price for sale of exported goods still results in unusual financial hardship, a petition for exception may be filed with the OPA.

2. Special cognizance is taken of distress and stranded iron and steel products, which were destined for export and shipped to a port of exportation prior to March 1, 1942, so incurring charges for ocean freight, marine or war risk insurance, or storage as a result of failure to secure necessary shipping space. In this category also are included certain shipments on the high seas Dec. 7, 1941, which were ordered back to West Coast ports, unloaded, and have piled up charges there since then. It also covers shipments originally destined for France, the Netherlands or similar European destinations. However, the ocean freight and insurance charges which may be added are limited by dates which approximate those on which our entry into the war affected shipments.

The clause dealing with such stranded material covers resale for making an export or domestic sale. This provision, however, expires July 1, 1942. After that date, the regular ceiling will apply. If an export sale is made, the maximum price is composed of three elements:

The export ceiling price as established by Price Schedule No. 49 or No. 6, iron and steel products, at the place at which the material is located, exclusive of any fees, commissions or charges; ocean freight and insurance to the extent actually paid on such material; storage charges attributable to failure to secure shipping space, not to exceed 5 per cent of the ceiling price at the place where the material is stored, however.

Fees May Be Added

To each of these three components can be added fees, commissions and charges for any export agent, export merchant or other intermediary, as provided for under the original schedule. Furthermore, the maximum price may be an f.o.b. price at the place at which such material is ultimately stored. This is to provide for the contingency that such iron and steel products might have to come for sale all-rail from San Francisco to New York, if no boats are available at the Pacific Coast ports.

Where such distress or stranded material is sold in the domestic market, determination of the peak price is similar to export sales, with two distinct differences: Domestic ceiling price is the basic standard, and no such addition can be made for fees, commissions or charges as are allowed in export sales.

3. A third phase of the amendment provides for export shipments in exceptional cases where the Board of Economic Warfare certifies that a price above the ceiling is necessary for considerations of political or military necessity, or because of the requirements of this country's economic warfare.

Following receipt of this certificate, the price administrator may grant such an exception. This provision is designed to handle extreme cases only and no certificate will be granted by the Board of Economic Warfare without very careful scrutiny.

The amendment, it was stated, was necessitated by recent developments, such as the increasing allocation of steel, and the future allocation of shipping space, together with the need to use available bottoms to best advantage. The new provisions are tailored in part to facilitate the flow of steel in such export channels as are deemed desirable, as well as in part to expedite domestic or export consumption of certain distress and stranded stocks of steel.

Salvaging the Normandie

SALVAGE operations are continuing day and night on the U. S. S. LAFAYETTE, formerly the French luxury liner NORMANDIE, which capsized after fire broke out on the 79,280-ton vessel at her pier in the Hudson river, New York, while being converted to Navy auxiliary ship. Photo shows street lighting system erected to aid workers attempting to right the vessel. Marine salvage experts are uncertain whether the task will be successful, but have stressed that they must utilize the ship's own buoyancy—that men and machines are not powerful enough. U. S. Navy photo

Millions of Women War Workers Needed To Achieve Arms Goal

MILLIONS of women workers must be recruited for war production during 1942 and 1943 if the arms output goal is to be realized.

WPB officials estimate the war labor force will be expanded to 15,000,000 by the end of this year and to 23,000,000 workers by the end of 1943. At present, only about 4,000,000 members of what statistical agencies term "the labor force" are unemployed. Obviously millions of new workers need to be drawn into the labor force, now being depleted of men through inductions into the Army.

One of the most important sources for new workers appears to be unemployed women; many skilled retired workers already have been called back to their jobs, and the youths who normally would be added to the labor market on completion of the academic work generally are eligible for the armed forces.

Three to four million women workers, possibly even more, will be drawn into war industry this year, according to predictions by Miss Thelma McKelvey, chief, Women's Labor Supply Service, WPB Labor Division.

"We must start training these workers now so that they will be ready as jobs open up," Miss McKelvey warns. "We cannot afford to wait until the last minute."

Place of women in war industries here was well established during the first World War. It has been elaborated in England and other European countries during the present conflict. In America, about one of every four workers in 1918 was a woman; today the ratio is about one to ten.

Miss McKelvey last week asserted that in many kinds of precision work, women are superior to men. Their adaptability to factory duties are limited only by the physical strength requirements of certain jobs.

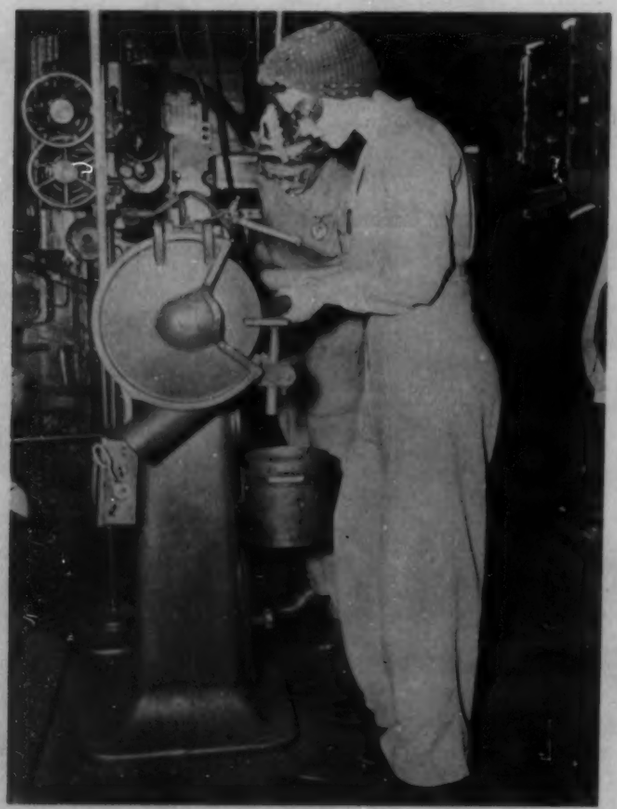
"It is not true," she said, "that women in industry are a safety hazard. Any new worker, man or woman, who takes up a new tool must be given safety instruction along with job instruction. To keep industrial accidents at a minimum, safety should be built into every job from the first moment of training.

"One of the major causes of industrial accidents is fatigue. Both men and women are subject to the fatigue which comes from too-long hours, insufficient rest or poor diet. These factors are not alone the workers' concern; they are very much the employers' concern, since they closely affect production."

Numerous war factories already have placed women on the assembly lines. At the new Ford bomber plant at Willow Run, Mich., 25 per cent of the assembly line workers are expected to be women. Curtiss-Wright and other leading producers likewise have greatly increased the ratio of women to men in precision jobs.

ADDITIONAL COPIES AVAILABLE

IF YOU would like extra copies of this week's poster, entitled "Ask Yourself", for use on your factory or office bulletin boards they are available from STEEL. Readers Service Department, Penton Building, Cleveland, Ohio.



OPERATE MACHINES AT NAVAL AIR STATION: Slack suits, heavy shoes, turbans, and "no jewelry" have been prescribed for the safety and efficiency of women employes at Alameda, Calif. The outfits are simple and attractive, minimize the danger of loose hair, ornaments and frills being caught in moving parts. NEA photos

Ask YOU

"Am I doing
to put mor
our fighti

---fr
M. Nel

OURSELF

I doing everything possible TODAY
out more weapons into the hands of
fighting men?"

---from Production Chief" Donald
M. Nelson's address to the nation.

STEEL APRIL 6

Government Inquiries

The following prime contracts are pending, with closing dates for bids as indicated. QR refers to quantity required. Bidding forms on these items can be obtained only by writing, mentioning schedule number, to the Procurement Branch of the service heading the list of requirements. Field offices of Contract Distribution Branch, WPB, generally have available for inspection and examination, schedules, invitations, specifications and drawings (where required) concerning these contracts.

BUREAU OF SUPPLIES, ACCOUNTS NAVY DEPARTMENT, WASHINGTON

691: Steel bolts and nuts, QR-Moderate to large. Bids April 10.

692: Bolts and nuts, steel, varying quantities of numerous types and sizes. Bids April 10.

696: Boat chains, iron or steel, galvanized, dia. of wire ¾", QR-162. Bids April 10.

699: Electric cable, insulated, arc-welding, QR-741,000.'. Bids April 10.

707: Waterproof protecting cap assemblies, time fuzes, zinc base die casting with threading operation, QR-1,-731,070. Bids April 10.

708: Pumps, centrifugal, motor driven; spare parts: tools and wrenches, QR-116. Bids April 9.

714—Electric cable, QR-large. Bids April 9.

721—Main feed pumps, centrifugal, turbine-driven, with spare parts and tools. QR-6. Bids April 10.

730—Blank steel shells, after-body and head, QR-11,400. Bids April 7.

742—Dummy torpedoes, QR-moderate. Bids April 10.

742—Dummy torpedoes, mark 17. QR-50. Bids April 10.

748—Cylinder valves (gas). QR-160,750. Bids April 7.

PUGET SOUND NAVY YARD, BREMERTON, WASH.

5015—Nonferrous welding rods, grade I, class A, size $\frac{1}{16}$-inch 36 inches long. QR-6500 pounds. Bids April 10.

5016—Corrosion resisting bar steel, grade 7, type D, round bolt or screw limiting dimensions, diameter 1¾-inches. QR-9000 pounds. Bids April 9.

5020—Bushings, iron; elbows, brass or bronze, iron; nipples, steel unions, composition Y branches, brass or bronze. QR-1106. Bids April 9.

5039—Carbon tool steel forgings, QR-6200. Bids April 11.

5051—Alloy, nickel copper, class A, cold-drawn, round, QR-4138 pounds. Bids April 13.

5054—Tubing, nickel-copper alloy, seamless, QR-9920 pounds. Bids April 10.

5066—Bar steel, class AN, heat-treated hexagon and round. QR-166,000 pounds. Bids April 13.

5103—Concrete reinforcement steel, type B bars, deformed, grade 2 intermediate, round, ½-inch, .67-pound per foot in 20 and 40-inch lengths. QR-250,000 pounds. Bids April 11.

Sub-Contract Opportunities

Data on subcontract work are issued by local offices of the Contract Distribution Branch, WPB. Contact either the office issuing the data or your nearest district office. Data on prime contracts also are issued by Contract Distribution offices, which usually have drawings and specifications, but bids should be submitted directly to contracting officers as indicated.

Cleveland office, Division of Contract Distribution, WPB, Union Commerce building, is seeking contractors for the following:

D-42: Subcontractor with forging and die sinking facilities to forge and perform minor machine operations on three items forming assembly. Weighing approximately six pounds.

D-43: Forging and die sinking equipment to furnish three parts of medium size. Two pieces 14⅛" long x 1⅛" wide x ⅛" thick. Also one piece weighing approximately 2⅛ lbs. of open construction. Also requirements on parts for which automatic screw machine and small mills are indicated. Blueprints on file. 12 parts in all.

D-44: Subcontractor to grind and wax polish filters and lens. Blanks for filters and lenses will be furnished by prime contractor. Delivery dates and quantity will be negotiated with prospective subcontractor. Blueprints on file this office.

Philadelphia office, Contract Distribution Branch, Production Division, WPB, Broad Street Station Building, reports the following subcontract opportunities:

2-B10-3: The government is lining up facilities to produce shell, H. E. 60MM, M9A2 consisting of body. Materials to be furnished by subcontractor consist of steel forgings or steel castings or rolled plate. Smallest tolerance is .003. Tools required are; Drop hammer facilities for at least 15-pound steel forgings which must be finished to 5.01-inch long and 2.362-inch maximum diameter, or steel castings allowable or rough formed by cupping special rolled plate and welding longitudinally. Also automatic chucking turret lathes and internal threading tools.

4-B7-1: Government arsenal requires subcontracting facilities for shell molds for 75 and 90MM guns. Tools required are: Engine boring lathes, 48 and 24-inch taper attachments, master boring bar available for tooling up. Crane facilities. Heat treating equipment. Material, grey iron castings, specification 14 x S 15 (2). Tolerances ¼-inch. Quantities twelve 22,900 pounds each 75MM and ten 44,500 pounds each, 90MM. A-1-a priority. Rush.

4-B10-1: New York City firm requires subcontracting on machining turrets for medium tank M4A2. Materials, to be furnished by prime contractor, are rough castings 85 x 80 x 31 inches (wt. 6600 pounds) and cast armor grade steel. Tolerances .001. Quantity, 960; production to begin at once with deliveries 60 June, 130 July, 130 August, then 160 per month. Tools required: Milling (12 hours per turret) horizontal milling machine capable of holding piece nine feet wide, including fixture. Should have 6-inch spindle. Vertical boring (16 hours per turret) with Carboloy tools, capable of nine-foot swings. Jigs, fixtures, gages and tools to be furnished by subcontractor. Material 230 to 260 Brinell hardness.

4-12-1: War Production Board, conversion unit, is seeking facilities for manufacturing Hamilton beveled and flat washers. Material required, chrome-tungsten alloy steel forgings, (heat treated and to be furnished by prime contractor.) Tolerance .001. Quantity 10,000 per month at 24-hour day, 576-hour month. Necessary equipment, ten Fay automatic lathes, two Campbell cutoff machines, three No. 25 Fafnir lathes, two No. 18 hand Blanchard, one Garrigus surface grinder, two Norton hydro-lappers, two 10-inch Norton plain grinders, four automatic screw machines, two centerless grinders, magnaflux testing, hardness testing, drawing and annealing furnaces, tools, dies, gages and fixtures.

4-12-2: War Production Board, procurement section, requires subcontracting facilities to manufacture cylinder-landing gear, Cleo strut. Parts are 3-inch I.D., 4-inch O.D., 28 inches long, I.D. and O.D. ground. Also to manufacture piston landing gears, Cleo strut. Parts of this item are 2.55-inches I.D., 2.874-inches O.D. and 27⅞ inches long, I.D. and O.D. ground. Material to be furnished by prime contractor is steel forging. Tolerance .002. Quantity, as many as possible. Contact by negotiation Tools required: Lathes, millers, internal and external grinders, thread millers (internal and external). Drill presses and heat treating equipment.

13-B11-1: A Lebanon, Pa., firm requires subcontracting facilities to corrugate 200 pieces of ¼-inch steel plate. Plates are 30 to 32 inches wide, with length after corrugation approximately 4 feet 3 inches. Corrugations to be 4$\frac{11}{16}$-inch pitch, between 1 and 1¼-inches deep. Corrugated sheets are for heat exchangers. Prime contractor will furnish flat sheets. Tools required: Corrugating rollers or heavy brakes with appropriate dies for forming corrugations (or equivalent).

13-B11-2: A Philadelphia manufacturer requires subcontracting facilities for cutting serrations on end of shaft. Length of shaft 5$\frac{1}{16}$-inch, diameter .874-inch. Serrations ⅛-inch long, 48 serrations per end. Prime contractor will furnish blank shafts. 100 pieces needed immediately, larger quantities to follow. Tools required, gear shaper or similar equipment.

13-12-1: A New York State firm requires subcontracting facilities in production of axles shafts, cams and gear cam shafts. Material to be furnished by subcontractor, is steel, SAE 3155, X-1314. Tolerances, .001. Five hundred to 4000 per month required, depending on part, production to start as soon as possible. Tools required, precision lathes, millers, 3½-inch screw machines, gear cutters both bevel and square, cylindrical cam grinding and heat treating equipment. Parts on display at Philadelphia exhibit. Plans and specifications at this office.

Chicago office, Contract Distribution Branch of WPB, 20 North Wacker Drive, is seeking contractors for the following:

4-F-A-203: This office has been requested to line up prime and subcontractors for production of gun barrels for 20 MM. A.A. guns. Equipment required: Deep drilling drills for drilling and reaming, such as Pratt & Whitney, Bement-Pond, LeBlond, Barnes or Stecher. Rifling machines, such as American, Broach-Sundstrand, LeBlond, Builders, Pratt & Whitney or similar. Honing machines, such as Enterprise, Barnes, or similar. Heavy-duty engine lathes, 12 to 18-inch swing, 12 to 16-inch centers. Requires ac-

curate machine work with close tolerances. Quantities will be large. Blueprints available at this office.

8-F-O-117: An eastern manufacturer desires to sublet contracts for planing and boring 130 tons of cast steel anvils. Tools required include 15-foot planer, 5-inch floor boring mill and 6 to 8-inch radial drill. Prime contractor will furnish steel castings.

9-F-N-205: Navy requires ten small parts. Samples and drawings available at this office. Total number required approximately 52,000 pieces. Requires multiple-spindle automatic, cylindrical grinders and milling machines. Also 15 items needed on another job, requiring spur and bevel gear cutting. Potter & Johnson or Fay automatic broaching and milling machines and auxiliary tooling equipment.

BTDC-A-1134: Facilities required to machine forgings of SAE 4640 steel ranging up to 24-inch diameter which can best be done on 36-inch vertical boring mills, lathes with 24-inch swing, gear shapers up to 20¾-inch diameter and gear hobber for 4-inch diameter. Quantities at present 1000 to 2000 per part. Material to be furnished by prime contractor. Blueprints at this office.

AOG-926: An eastern manufacturer requires additional facilities for producing small gun parts. A battery of No. 3 or 4 vertical and horizontal milling machines, also deep-hole boring equipment required. Lathes suitable for deep-hole boring can be used. Close tolerances are involved.

Limit Output of Office Supplies To Save Steel

WASHINGTON

CURTAILMENT in the use of iron and steel in the manfacture of metal office supplies, such as paper clips, thumb tacks, pencil sharpeners, and various desk accessories, has been ordered by WPB.

Program is designed to release approximately 19,300 tons of iron and steel this year for ships, guns, tanks, and other war products, in addition to large amounts of critical materials.

Office supplies covered by the order are essential to Army, Navy, government and lend-lease operations. The program is designed to take care of these needs and at the same time meet essential civilian demands. The ordinary consumer will not be able to obtain supplies in usual quantities. However, no shortage should occur if consumers make careful use of supplies.

The limitation order, L-73, prohibits manufacturers of office supplies from using any copper, tin, nickel, chromium, cadmium, or crude rubber unless already processed beyond the first stage of cutting or stamping. Use of zinc is restricted to galvanizing necessary for practicable use and wear.

Effective immediately, the order imposes restrictions on iron and steel consumption in three classes of office supplies beginning April 1, using 1940 as the base period. That year is regarded as the most recent normal production year. Production last year was from 30 to 50 per cent above the 1940 rate, depending upon the product.

With one exception, the restrictions on iron and steel consumption for the three months beginning April 1 will remain in force during each three-month period.

Wire staples, which contain only a small amount of iron and steel, are classed alone in Group 1, and iron and steel may be used in producing them at the same rate as during 1940.

Use of iron and steel in products in Group 2 must be cut during the next three months by 20 per cent below the 1940 rate of consumption. Products included in this group are : Clips, clamps, pins and thumb tacks; copy holders; eyelet and round and flat-head fasteners; eyeleters; file fasteners; pencil sharpeners; punches and perforators, and stapling and fastening machines. For each quarter beginning July 1, the rate of curtailment for this group will be increased to 40 per cent.

Federal Specifications Govern

A 50 per cent cut below the 1940 consumption rate was ordered for iron and steel consumption in products in Group 3. This group covers adhesive and gummed tape dispensers; arch and clip board files; calendar stands; desk accessories; inked ribbon spools and containers; list finders; rulers and yardsticks; staple removers, and any stationery sundries not in Group 1 or 2.

Producers may exceed their quotas in order to take care of government contracts, but the excess must be cut from later quotas.

An important feature of the order is that all manufacturers, regardless of whether they are working on a government or civilian order, must adhere to federal specifications for metal office supplies issued from time to time by the Director of Procurement. These specifications are designed to reduce the amount of critical materials required to produce these supplies.

All-Cast Tank, Armored and Ready for Action

THE NEW M-4 Medium tank, now complete with armament, including a 75-mm gun and machine guns, shown in tests by Armored Force Board at Fort Knox, Ky., headquarters of the United States Armored Force. The tank is streamlined, has the 75-mm gun in the center, instead of the right side as in the M-3, is lower in silhouette, has an all-cast body instead of riveted, and weighs 30 tons, the same as the M-3. The turret turns 360 degrees. Signal Corps photo

WPB Seizes 10,000 Tons Scrap from Farm Dump

Steel scrap estimated at 10,000 tons has been seized by the Bureau of Industrial Conservation, War Production Board, on the farm of James, Jacob and Owen Eby, near Dayton, O.

The scrap consists of rejected refrigerator cabinets from the Frigidaire division of General Motors Corp., which had paid $240 per year for ten years for the privilege of dumping them in a ravine.

Eby brothers will be paid $4 per ton and the scrap will be removed by Israel Bros. Co., Dayton, who will prepare and ship it to a steel mill at Pittsburgh.

War Production Board recently requisitioned 150 tons of scrap material from Frank Schumak at Valparaiso, Ind.

Regional Advisory Committee Formed at Chicago Meeting

Iron and steel scrap dealers from northern Illinois, northern Indiana, Wisconsin and western Iowa, meeting in Chicago March 30 elected a regional advisory committee on scrap, as provided under the OPA price enforcement rule.

The committee includes: Ben Kaplan, M. S. Kaplan Co.; William J. Ross, Hyman-Michaels Co.; Hunter Hicks, Merchants Steel & Supply Co.; Arthur M. Price, Price-Watson Co.; Harry S. Lewis, Price Iron & Steel Co.; John T. McEnroe, John T. McEnroe Co.; D. R. Cohen, D. R. & F. A. Cohen; William Pohn, Pohn Iron & Metal Co., all of Chicago; Claude Scott, Grossman Iron & Metal Co., Milwaukee; Rufus A. Heller, W. A. Heller Co., Peoria, Ill.; L. Livingston, Livingston Iron Co., Rock Island, Ill..

Spherical Steel Hospital at Cleveland Wrecked for Scrap

Dismantling of a five-story steel globe 64 feet in diameter, containing 1000 tons of steel, has been started at Cleveland, the steel to be sold as scrap. Built at a cost of $1,000,000 in 1928 the spherical structure was used as a hospital for diabetics, treated under air pressure. Kulka Co. Inc., Youngstown, O., is wrecking the structure. Three smaller steel annexes surrounding the sphere also will be dismantled. The hospital was chiefly financed by the late H. H. Timken, Timken Roller Bearing Co., Canton, O., for the late Dr. Orval J. Cunningham, after a friend of Mr. Timken made what the latter considered a marvelous recovery from diabetes under Dr. Cunningham.

The structures have been unused for several years.

CEREMONY at the Pratt & Whitney Division of United Aircraft Corp. was timed with shift changes so as to not interrupt production of war materials

More Steel, Metalworking Companies Honored with Navy "E" Awards

EXCELLENCE in turning out vitally needed war materials has been rewarded by the Navy Department with "E" awards to several more metalworking companies.

Lukens Steel Co., Coatesville, Pa., was presented the pennant March 27 at Scott Field before more than 12,000 spectators. Ralph A. Bard, Assistant Secretary of Navy, in making the award said the Navy was deeply appreciative of the way the company has filled its contracts, expanded and improved plant facilities to take on more work and established new output records monthly.

In accepting, Robert W. Wolcott, Lukens president, said company's steel shipments now are almost twice those of any time before the emergency.

"We are bettering by many times the production to which we obligated ourselves when we signed our first facilities contract. The facilities furnished under this contract by the Navy enables Lukens on our 206-inch mill to make the widest, thickest and heaviest rolled armor plate ever produced."

Mr. Wolcott said the company now is undertaking for the Navy another expansion program.

Pratt & Whitney Division of United Aircraft Corp., East Hartford, Conn., received the Navy "E" March 25. In the above illustration, Rear Admiral John H. Towers, U. S. N., chief of the Bureau of Aeronautics, is shown on the platform on Rentschler Field handing the pennant to H. M. Horner, divisional general manager and vice president of United Aircraft Corp.

Reliance Electric & Engineering Co., Cleveland, received the Navy "E" award on March 24, during a ceremony held in the machine shop and witnessed by a large delegation of the company's 1300 employes.

The "E" pennant now flies over the Wilmington, Del., shipyard of American Car & Foundry Co., which dates back to the time of the early clipper ships that once were produced there. The award was made April 2.

Morgan Engineering Co., Alliance, O., also was awarded the Navy "E" on April 2, presentation being made by Capt. E. A. Lofquist, chief of staff of the ninth naval district.

Employes, Stockholders Hold "Family" Dinner

Macwhyte Co., Kenosha, Wis., manufacturers of wire rope, invited all employes and stockholders to a traditional "family" dinner recently and explained progress and details of the company's business.

Service certificates were awarded to employes with 5, 10, 15, 20 and 25 years' service. Twenty-five-year employes received gold watches from Jessel S. Whyte, president.

The Macwhyte club presented a plaque to George S. Whyte, board chairman, who recently observed his 75th birthday.

MEN of INDUSTRY

CARL I. COLLINS, elected on March 26 to the board of directors, Wickwire Spencer Steel Co., New York, will be named executive vice president at the next meeting of the board. After graduating in mechanical engineering from Georgia School of Technology, Mr. Collins entered the steel business with the Atlanta Steel Co. Since 1935 he has been manager of operations, Worcester district, American Steel & Wire Co., which position he resigned to join Wickwire Spencer.

♦

Roy I. Reynolds has been appointed assistant sales manager of the governmental sales division, Caterpillar Tractor Co., Peoria, Ill.

♦

Bennett Chapple, assistant to the president, American Rolling Mill Co., Middletown, O., has been elected to the board of directors, Advertising Council Inc., New York.

♦

R. S. Ahlbrandt, Pittsburgh district sales manager, Allegheny Ludlum Steel Corp., has been granted leave of absence to accept a lieutenant's commission in the United States Navy.

♦

Edward Payson Bullard III has been elected vice president in charge of manufacturing, The Bullard Co., Bridgeport, Conn. He has designed many tools for the company and its customers, and since last spring has been in charge of creating a factory scheduling system under which output of machine tools has been quadrupled.

John A. Bullard, sales engineer,

Carl I. Collins

and **J. W. C. Bullard Jr.,** associated with the purchasing department, have been elected to the board of directors.

E. P. Bullard Jr. has been re-elected president, and **E. C. Bullard,** vice president and general manager.

♦

S. N. F. Hedman has been appointed designing engineer, mechanical drive section, Turbine Engineering Department, General Electric Co., Schenectady, N. Y. Associated with the company about 17 years, he succeeds **R. G. Standerwick,** who will devote all of his time to another department.

♦

J. B. Colesworthy, formerly associated with the Los Angeles sales organization of Westinghouse Electric & Mfg. Co., has been named Los Angeles district sales representative of Crocker-Wheeler Electric Mfg. Co., Ampere, N. J., with headquarters at 1709 West Eighth street, Los Angeles.

♦

Charles D. Cavett has been appointed advertising and sales promotion manager, Cummins Diesel Engine Corp. of New York, New York. The past three years he had been on the copy staff of Spencer W. Curtiss Inc., Indianapolis industrial agency.

♦

John J. Fitzpatrick has been elected a vice president, Armstrong Cork Co., Lancaster, Pa. Mr. Fitzpatrick, who is general manager of Armstrong's Munitions Division, has been associated with the company since 1911.

♦

Harry L. Berno has been commissioned a captain in the United States Army. It is reported he will be assigned to a procurement branch of the Ordnance Department, Washington. Heretofore Mr. Berno has been president, W. H. Davey Steel Co., Cleveland, which recently sold its Cleveland mills.

♦

Cyril Grindrod has resigned as sales engineer, Wyckoff Drawn Steel Co., Chicago, to become assistant vice president in charge of production, S. F. Bowser Co., Fort Wayne, Ind. **William Bamford Sr.,** chief production engineer of the Bowser company, has become vice president, Fostoria Screw Products Co., a subsidiary.

♦

D. M. MacNeil has been named New England district sales manager, Wheeling Steel Corp., Wheeling, W. Va., with headquarters in Boston. He succeeds **H. W. Reynolds,** resigned. Associated with Wheeling since 1925, Mr. MacNeil recently has been a salesman in the New England territory.

♦

Robert S. Maddocks, district sales manager in New York for Central Iron & Steel Co., Harrisburg, Pa., has resigned to become associated with Paterson Boiler & Tank Inc., Paterson, N. J., steel plate fabricator.

♦

Russell B. Barnett, branch manager at Buffalo for Peter A. Frasse & Co. Inc., has been transferred to

John A. Bullard

E. P. Bullard III

J. W. C. Bullard Jr.

Philadelphia in the same capacity. **Leslie N. Stetson,** formerly sales representative in the Buffalo area, succeeds Mr. Barnett as manager of that office.

♦

Allen E. Bailey Jr. and **William D. Cockrell** have been appointed manager of sales and engineer, respectively, of the newly organized electronic control section, Industrial Control Division, General Electric Co., Schenectady, N. Y. Mr. Bailey will report to **G. R. Prout,** manager, Industrial Control Division, and Mr. Cockrell to **E. H. Alexander,** engineer of that division.

♦

Kemper L. Kellogg, formerly assistant secretary, Newport News Shipbuilding & Dry Dock Co., Newport News, Va., has been elected secretary. He succeeds **George A. Parker,** who has become assistant to the president.

♦

Milo F. Snyder has resigned as secretary of Loewi & Co., Milwaukee, to become financial officer of Ampco Metal Inc., Milwaukee.

♦

Thomas H. Queer has been elected chairman, Bituminous Coal Producers Board, Pittsburgh, succeeding the late J. O. Smith. Mr. Queer had been vice chairman of the board.

♦

W. E. Corrigan, vice president, American Locomotive Co., New York, in charge of munitions and miscellaneous sales, has assumed additional duties as head of diesel engine sales. Diesel locomotive sales will remain under supervision of **Perry T. Egbert.**

♦

Alan J. Pickering has been elected assistant treasurer, Republic Aviation Corp., Farmingdale, New York. Since September, 1940, he has served as an assistant to **Thomas Davis,** treasurer.

♦

Walter F. Munford has been appointed manager of operations, Worcester, Mass., district, American Steel & Wire Co. Following graduation from Worcester Polytechnical Institute and Massachusetts Institute of Technology, he became a helper in the open-hearth department of the Wire company at Worcester. After serving in various executive positions he became assistant manager of operations, Pittsburgh district, in 1939.

Walter F. Munford

A. E. Bailey Jr.

W. D. Cockrell

♦

Russell H. Dunham was re-elected chairman of the board, Hercules Powder Co., Wilmington, Del., at its annual meeting recently. Other officers re-elected are: President, **Charles A. Higgins;** vice presidents, **Leavitt N. Bent, Charles A. Bigelow, Petrus W. Meyeringh, Anson B. Nixon** and **Gould G. Rheuby;** secretary, **Raymond N. McAdams;** treasurer, **Edward B. Morrow.**

♦

James W. Bancker, director and vice president, Western Electric Co., New York, retired March 31 after nearly 50 years of service.

♦

Robert A. Wickes, heretofore comptroller and office manager, American Anode Inc., Akron, O., a subsidiary of B. F. Goodrich Co., has become associated with American Bosch Corp., Springfield, Mass., as secretary-treasurer. He succeeds **Carl C. Francis,** who has resigned to become president, Putnam Trust Co., Greenwich, Conn.

♦

George Case Jr., assistant to president, Lamson & Sessions Co., Cleveland, has been elected treasurer. He will continue his duties as assistant to president.

♦

Horace J. Grover, heretofore a member of the faculty, Rensselaer Polytechnic Institute, Troy, N. Y., has joined Battelle Memorial Institute, Columbus, O., as a research physicist, and has been assigned to research in industrial physics.

♦

Charles S. Craigmile, vice president, Belden Mfg. Co., Chicago, has been re-elected president of the Chicago branch, National Metal Trades Association, while **Arthur T. Clarage,** president, Columbia Tool Steel Co., Chicago Heights, Ill., has been elected vice president.

♦

G. M. Williams has been elected a director, vice chairman of the board and a member of the executive committee, Vultee Aircraft Inc., Downey, Calif. At the end of the war he will resume his post of chairman and president, Russell Mfg. Co., Middletown, Conn.

♦

John H. Ashbaugh, manager of manufacturing and engineering of Westinghouse Electric & Mfg. Co.'s merchandising division since November, 1941, has been appointed manager of that division, with headquarters in Mansfield, O. Associated with Westinghouse 24 years, he was named assistant manager of engineering at the Springfield, Mass., works in 1931, a year later becoming manager of engineering. Prior to his appointment as manager of manufacturing and engineering, merchandising division, he was acting manager of those activities in the Westinghouse plants at Mansfield and Springfield.

John H. Ashbaugh

DIED:

Chester W. Phillips, 54, superintendent of maintenance at Republic Steel Corp.'s Cleveland steel plants, March 26, in Buffalo. He joined Trumbull Steel Co., Warren, O., a predecessor company of Republic, and in 1937 was transferred to the Cleveland district. He was a member, Association of Iron and Steel Engineers.

♦

David M. Craig, 67, for many years an official of Koppers Co., Pittsburgh, recently in that city. He joined Koppers as an engineer in the construction department in 1915 and in recent years had been in charge of personnel and insurance.

♦

William H. Griner, 63, retired consultant, St. Marys Foundry Co., St. Marys, O., and from 1920 to 1935 a foundry engineer with Charles C. Kawin Co., Chicago, at his home in Kenton, O., March 20.

♦

James E. Gorman, 78, president, Chicago, Rock Island & Pacific railroad, Chicago, March 25, in Evanston, Ill.

♦

Harold P. Root, 54, assistant director of purchases, Curtiss-Wright Corp.'s airplane division, New York, March 23.

♦

John J. Enot, founder and president, Enot Foundry, Wayne, Mich., March 27. During World War I Mr. Enot experimented with aluminum pistons and aided in the development of the Liberty airplane motor.

♦

Frank G. Harrison Sr., 70, founder and president, Spun Steel Corp., Canton, O., and formerly head of the Massillon Foundry & Machine Co., Massillon, O., March 28, in Clearwater, Fla.

♦

August C. Ulrich Sr., general superintendent, Gould & Eberhardt, Irvington, N. J., machine tool manufacturer, March 27, in Newark, N. J.

♦

Frank M. Harbison, 55, assistant treasurer, Jones & Laughlin Steel Corp., March 24, in Los Angeles. Mr. Harbison had been with Jones & Laughlin 42 years.

♦

Charles R. Webb, 84, retired sales manager, American Steel & Wire Co., in Worcester, Mass., March 22.

♦

Henry P. Davis, 42, superintendent, Permanente Cement Co. and Permanente Magnesium Corp., Los Altos, Calif., March 24. He had been closely identified with the Henry J. Kaiser interests on the Pacific coast and was superintendent of construction of several phases of the Grand Coulee and Bonneville dams.

♦

William D. Alexander, 75, retired president of the old Albany Malleable Iron Co., Voorheesville, N. Y., now the Voorheesville Castings Works, March 22, at his home near Albany.

♦

Bernard R. Classen, 59, assistant branch manager, Chase Brass & Copper Inc., Chicago, in that city, March 30.

♦

Fred H. Law, 65, vice president in charge of traffic, Illinois Central railroad, Chicago, March 30, in that city.

295 Locomotives in Baldwin's Backlog

After delivering 62 locomotives, steam, diesel-electric and electric, to American and foreign railroads, industries and governments in the first three months of 1942, Baldwin Locomotive Works, Philadelphia, reports it still had a backlog of 295 locomotives on its books. Of these, 89 represent orders received since Jan. 1.

The current backlog includes 203 steam locomotives and 92 electrics or diesel-electrics. Many of these are for railroads in Mexico, Bolivia, Colombia, Chile, Alaska and India. Numerous others are for use of American manufacturing and mining companies and the government.

Convention Calendar

April 6-7—Machine Tool Electrification Forum. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

April 14-17—Packaging Institute Inc. Packaging Exposition and Conference, Hotel Astor, New York. H. L. Stratton, 342 Madison avenue, New York, is secretary.

April 16-17 — Open-Hearth Committee. Twenty-fifth conference of open-hearth, blast furnace and raw materials committees, American Institute of Mining and Metallurgical Engineers at Hotel Netherland Plaza, Cincinnati. F. T. Sisco, 29 W. 39th street, New York, is secretary.

April 20-21 — Galvanizers Committee. Eleventh meeting at Hotel Chase, St. Louis. Sponsored by American Zinc Institute Inc. E. V. Gent, 60 East 42nd street, New York, is secretary.

April 20-21 — American Zinc Institute, Inc. Twenty-fourth annual meeting, Chase hotel, St. Louis. E. V. Gent, 60 East 42nd street, New York, is secretary.

April 20-24—American Chemical Society. Annual meeting, Memphis, Tenn. Dr. C. L. Parsons, 728 Mills building, Washington, is secretary.

April 20-24—American Foundrymen's Association. Foundry and Allied Industrial Show, Cleveland Auditorium and Exhibition Hall, Cleveland. R. E. Kennedy, 222 Adams street, Chicago, is secretary.

April 23-25—Concrete Reinforcing Steel Institute. Eighteenth annual meeting, The Homestead, Hot Springs, Va. H. C. Delzell, 228 N. LaSalle street, Chicago, is executive secretary.

April 27-30—Chamber of Commerce of the U. S. of America. Thirtieth annual meeting at Washington. Ralph Bradford, 1615 H street, Washington, is secretary.

April 27-May 1—American Mining Congress. Nineteenth annual coal convention and exposition, Cincinnati. J. D. Conover, 309 Munsey building, Washington, is secretary.

May 4-6—Southern Supply & Machinery Distributors Association. Thirty-seventh triple convention at Hotel Traymore, Atlantic City, N. J. Alvin M. Smith, P. O. Box 1353, Richmond, Va., is secretary.

May 4-6—National Supply and Machinery Distributors Association. Thirty-seventh triple convention at Hotel Traymore, Atlantic City, N. J.; H. R. Rinehart, 505 Arch street, Philadelphia, is secretary.

May 4-6—American Supply and Machinery Manufacturers Association. Thirty-seventh triple convention at Hotel Traymore, Atlantic City, N. J. R. Kennedy Hanson, 1108 Clark building, Pittsburgh, is general manager.

May 4-7—American Gas Association. Nineteenth annual distribution conference, St. Charles hotel, St. Louis. E. D. Milener, 420 Lexington Ave., New York, is secretary.

May 4-7—Natural Gas Convention. Thirty-seventh annual meeting, Roosevelt hotel, St. Louis.

May 11-13—American Gear Manufacturers Association. Fifty-first annual meeting, Hotel Hershey, Hershey, Pa. J. C. McQuiston, 602 Shields building, Wilkinsburg, Pa., is manager-secretary.

May 11-13—American Institute of Chemical Engineers. Semiannual meeting at Statler hotel, Boston. S. L. Tyler, 50 E. 41st. street, New York, is secretary.

May 11-13—American Steel Warehouse Association. Thirty-third annual meeting at Drake hotel, Chicago. Walter S. Doxsey, 442 Terminal Tower, Cleveland, is secretary.

May 13-14—American Management Association. General management conference at Hotel Astor, New York. H. J. Howlett, McGraw-Hill building, 330 W. 42nd. street, New York, is secretary.

May 15—Porcelain Enamel Institute. Eleventh annual meeting, Hershey hotel, Hershey, Pa. Charles S. Pearce, 919 New York avenue, Washington, is managing director.

May 19-20—National Metal Trades Association. Forty-fourth annual convention, Biltmore hotel, New York. Harry S. Flynn, Room 1021, 122 S. Michigan avenue, Chicago, is secretary.

May 21—American Iron and Steel Institute. Fifty-first meeting, Waldorf-Astoria, New York. George S. Rose, 1829 Empire State building, 350 Fifth avenue, New York, is secretary.

May 25-28—National Association of Purchasing Agents. Twenty-seventh annual convention, Waldorf-Astoria, New York. George A. Renard, 11 Park Place, New York, is executive secretary.

Columbia Steel Expansion To Cost $8,500,000

COLUMBIA Steel Co., San Francisco, subsidiary of United States Steel Corp., last week announced additions to its Pittsburg and Torrance, Calif., plants to provide more open-hearth and electric furnace capacity and finishing facilities to cost $8,500,000, financed entirely by the corporation.

This will complete U. S. Steel's part—amounting to more than one-third—in the 10,000,000-ton steel ingot expansion program recommended last year by government defense authorities. The new U. S. Steel facilities, major part of which are being built at the expense and for account of the government, also embrace "vast iron and steel producing facilities in the Pittsburgh and Chicago districts, and the construction of new iron and steel producing and finishing facilities in Utah and California."

A digest of state and federal labor legislation enacted from July 1, 1940, to July 1, 1941, has been published as Bulletin No. 48 by the Division of Labor Standards, Department of Labor. It is the seventh annual issue.

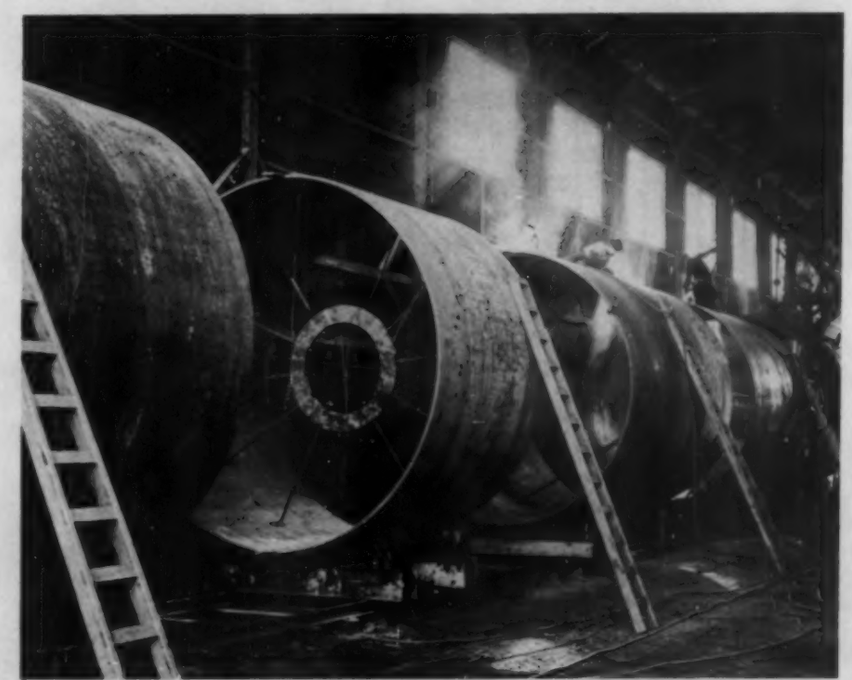
The publication summarizes the text of labor laws enacted by the 43 state legislatures in session in 1941 as well as by legislatures in Alaska, Hawaii and Porto Rico and by the United States Congress. While the volume of labor legislation was not large, notable advances were made in some states. Copies of the bulletin may be obtained free from the Division of Labor Standards, Department of Labor, Washington.

Harvester Tells Employes Of Greater Part In War

International Harvester Co.'s annual report to employes issued last week emphasizes the firm's greater capacity to aid in the war program. Present working capital of $245,015,000 compares with $91,000,000 in World War I. The company's principal plants in 1942 number 20, as against 13 in 1917.

Total orders for war work to Oct. 31, 1941 exceeded $100,000,000, the largest single contract being for construction of the new streamlined Army tanks, the report stated. Farmall and East Moline, Ill., works will make subassemblies, parts.

Assembly Line Rigs Shasta Penstock Pipe for Welding



MASS production methods, patterned on the continuous automobile assembly line, are being applied to the welding of large pipe for the Bureau of Reclamation's Shasta Dam power project in northern California. The sections, 15 feet in diameter, shown on their movable carriers, will form part of five giant penstocks to carry water from the reservoir to the electro-turbines. NEA photo

Steel Employment, Wage Rates Hold At High Level

FEBRUARY steel employment continued at the same high level as in January, with an average of 651,000 employes in both months, according to the American Iron and Steel Institute. In February, 1941, 603,000 were employed.

The shorter month caused payrolls to decrease from $118,785,000 to $108,563,000. The latter figure is 20 per cent above the February, 1941, total of $89,586,000.

Wage earning employes earned an average of 99.5 cents an hour in February, compared with 99.2 cents in January and 86.9 cents in February, 1941.

Although the steel plants themselves were in operation 24 hours a day and 7 days a week, wage earners worked an average of 39 hours a week in February, compared with 39.2 hours in January and 39.4 hours in February last year.

"Union Security" Demand Rejected by Federal Ship

Conflict between Federal Shipbuilding & Dry Dock Co., United States Steel Corp. subsidiary, and the CIO on the union security issue was renewed last week before the National War Labor Board. Originally it resulted in seizure of the company's Kearny, N. J., yard by the Navy at request of the President when the CIO demanded and the company refused to include a closed shop clause in a labor contract. Plant was returned to the company in January without settlement.

The CIO Union of Marine and Shipbuilding Workers renewed its demands, asking for a maintenance of membership clause.

Nathan L. Miller, general counsel for U. S. Steel, told the NWLB he would advise the corporation to reject the demand because it would violate National Labor Relations statute provisions against discrimination for membership or nonmembership in labor unions.

Wins Safety Trophy

Electrical Cable Works of American Steel & Wire Co., Worcester, Mass., U. S. Steel subsidiary, last week received the annual award of the Massachusetts Safety Council for a workable accident prevention program. This is the division's third trophy. The cable works, employing 1000, is the largest plant in the state to have no lost-time accidents during 1941.

Steel Industry's Sales Volume Up 52% In 1941, with Moderate Gain in Profits

Income on capitalization for 25 companies averages 7.92 per cent . . . Taxes increased 162.7 per cent to new peak of $547,954,296 . . . Total income before dividends and interest $323,370,728

NET SALES volume reported by 22 steel producers in 1941 increased 52.1 per cent over 1940, while their net profit was up only 13.3 per cent. It is believed this is fairly representative of the industry's experience. Sharp advances in taxes absorbed most of the gains in earnings.

Net sales for 22 companies in 1941 totaled $3,147,498,008, compared with $2,069,927,608 in 1940. Net profit for these same companies amounted to $295,043,182—a comparatively small improvement over $260,309,958 reported for 1940.

Income on capitalization for the 25 companies listed in the accompanying tabulation for 1941 averaged 7.92 per cent. This compares with 7.57 per cent for them in 1940. It was the highest since 1929 when the same reported 9.88 per cent. The industry's aggregate deficits in 1932 and 1933—depression lows—were respectively equal to 2.85 and 0.9 per cent of capitalization.

Profit Margin on Sales 5.53 Per Cent

Taxes for the 25 companies in 1941 rose 162.7 per cent to a peak of $547,954,296. In 1940 the total was $208,594,514 for the same companies, while in 1939, 1938 and 1937 taxes for substantially the same group of steel producers amounted to $134,762,731—$94,497,117—and $159,992,152, respectively.

Tax burden per common share last year was equal to $15.26, against $6 in 1940, $3.98 in 1939, and $4.78 in 1937.

Total income before dividends and interest on bonds aggregated $323,370,728 in 1941, and $299,708,821 in 1940.

Average income per common share, after allowance for preferred stock requirements, was equal to $6.94 per share last year, up slightly from the $6.11 for 1940.

Net profit margin on the net sales reported was 5.53 per cent last year, or below the 1940 showing of 7.48 and the 5.66 per cent reported for 1939.

Total capitalization of the 25 companies rose slightly to $4,082,484,334, from $3,961,176,959 for the same group at the close of 1940. Combined assets of the companies gained 9.5 per cent to $5,078,546,582. All 25 steel producers reported an increase in total surplus over the past year. Aggregate surplus for the group was $1,025,896,860, or an increase of 15.99 per cent from $884,445,819 in 1940.

Combined long-term debt for the group again declined in 1941 to $807,398,388. In 1940, 1939 and 1938, the funded debt total for practically the same group amounted to $815,769,024, $816,380,291 and $830,268,110 respectively.

Liabilities Increased 64 Per Cent

During 1941 current assets rose 22.6 per cent to $2,058,260,524 and current liabilities increased 64.3 per cent to $742,609,431, leaving net quick assets of $1,315,651,093. This represents a gain of 7.57 per cent over net quick assets of $1,223,085,875 at the close of 1940.

Number of common shares outstanding reported by the group increased during the past year, while preferred stock valuation declined slightly.

Dividends paid on common stock by the individual companies throughout 1941 in almost every instance recorded a substantial gain. Of the 25 companies reporting, 17 paid more on common, seven reported dividend payments unchanged while one paid less. In this latter instance the company increased the number of shares outstanding from 200,000 at the close of 1940 to 600,000 on Dec. 31, 1941.

All steel producers operated at practical capacity throughout 1941. While individual company operations were not available for publication, ingot production for the industry as a whole reached a new peak of 82,927,557 net tons, at the rate of 97.4 per cent of capacity. This compares with 82.1 per cent of capacity, equal to 66,981,662 net tons, reported in the preceding year.

STEEL wishes to acknowledge with thanks the cooperation of all companies that supplied data in the accompanying tabulation. Additional copies may be obtained from Readers' Service department, STEEL.

Financial Analysi

Official Returns from Twen

	No. Shares Common Stock Outstanding		Common Stock Valuation		Preferred Stock Valuation		Funded D
	1941	1940	1941	1940	1941	1940	1941
United States Steel Corp.	8,703,252	8,703,252	$652,743,900	$652,743,900	$360,281,100	$360,281,100	$181,238,442
Bethlehem Steel Corp.	2,984,994	2,984,994	283,574,430	283,574,430	93,388,700	93,388,700	181,778,095
Republic Steel Corp.	5,670,628	5,670,628	130,309,141	130,309,141	33,958,950	37,693,450	95,224,569
Jones & Laughlin Steel Corp.	1,311,161	576,320	57,662,700**	57,632,000	58,682,900**	58,713,900	40,375,000
National Steel Corp.	2,205,667‡	2,204,667	54,866,675	55,116,675	None	None	60,931,348
Youngstown Sheet & Tube Co.	1,675,003	1,675,003	105,038,053	105,088,053	15,000,000	15,000,000	74,796,352
Inland Steel Co.	1,633,105	1,628,625	60,979,310	60,755,310	None	None	46,680,000
American Rolling Mill Co.	2,868,674	2,868,637	71,739,009	71,739,009	44,993,000	45,000,000	23,300,000
Wheeling Steel Corp.	569,674	569,674	28,483,700	28,483,700	36,316,600	37,795,200	34,800,000
Colorado Fuel & Iron Corp.§§	563,620	563,620	5,636,200	5,636,200	None	None	15,518,200
Pittsburgh Steel Co.	508,917	508,917	4,862,190	4,862,190	15,771,300	15,471,000	8,380,000
Crucible Steel Co. of America	445,198	445,198	11,129,943	11,129,943	32,932,000	33,432,000	15,700,000
Otis Steel Co.	916,536	916,579	4,582,680	4,582,895	10,288,050	10,294,890	13,063,000
Alan Wood Steel Co.	200,000	200,000	4,388,889	4,388,889	7,186,133	7,186,133	None
Lukens Steel Co.§*	317,976	317,976	3,179,760	3,179,760	None	None	3,212,700
Sharon Steel Corp.	392,331	392,331	3,974,530	3,974,530	5,972,000	5,972,000	1,600,000
Allegheny Ludlum Steel Corp.	1,256,251	1,256,922	7,872,269	7,855,763	2,838,800	3,342,600	None
Granite City Steel Co.	382,488	382,488	8,483,821	8,483,821	None	None	3,128,777
Northwestern Steel & Wire Co.	163,565	163,565	817,825	817,825	75,000	75,000	798,203
Continental Steel Corp.	200,561	200,561	5,276,243	5,276,243	1,853,929	1,870,264	1,400,000
The Midvale Co.	600 000	200,000	10,574,621	10,574,621	None	None	None
Laclede Steel Co.	206.250	206,250	4,125,000	4,125,000	None	None	750,000
Keystone Steel & Wire Co.	757,632	757,632	3,156,800	3,156,800	None	None	600,000
Rustless Iron & Steel Corp.	926,547	926,547	926,547	926,547	1,189,088	1,189,088	2,400,000
Wickwire Spencer Steel Co.	459,316	459,316	4,593,164	4,593,164	None	None	1,714,702
Total (or average)	35,919,351	34,779,707	$1,529,027,400	$1,529,006,409	$720,727,550	$726,705,325	$807,389,388

	Net Profit Margin Per Cent		Net Income Before Dividends		Preferred Stock Dividend Requirements		Dividends Paid Per Share on Preferred		Income Per Common Share	
	1941	1940	1941	1940	1941	1940	1941	1940	1941	1940
United States Steel Corp.	....	....	$116,171,075	$102,211,282	$25,219,677	$25,219,677	$7.00	$7.00	$10.45	$8.8
Bethlehem Steel Corp.	3.58	8.08	34,457,796	48,677,524	6,537,209	6,770,680	7.00†	5.25†	9.35	14.0
Republic Steel Corp.	5.00	6.96	24,038,340	21,113,507	2,072,808	2,411,403	6.00*†	24.00*†	3.87	3.3
Jones & Laughlin Steel Corp.	7.53	6.70	16,274,983	10,277,029	2,696,005	4,109,973	3.50	4.00	10.85	10.7
National Steel Corp.	8.53	9.54	17,102,350	15,066,341	None	None	None	None	7.75	6.8
Youngstown Sheet & Tube Co.	7.13	7.56	16,124,401	10,815,468	825,000	825,000	5.50	5.50	9.13	5.9
Inland Steel Co.	7.31	10.16	14,824,053	14,450,385	None	None	None	None	9.08	8.8
American Rolling Mill Co.	6.64	6.80	11,228,475	7,642,714	2,024,731	2,025,000	4.50	7.38	3.21	1.9
Wheeling Steel Corp.	6.48	6.11	8,506,304	5,685,848	1,837,064	1,904,546	5.00‡	5.00‡	11.71	6.6
Colorado Fuel & Iron Corp.§§	5.83	5.48	2,288,318	1,744,869	None	None	None	None	4.06	3.1
Pittsburgh Steel Co.	5.16	4.47	3,169,598	1,556,000	860,660	869,162	2.75††	None††	4.54	1.3
Crucible Steel Co. of America	5.82	8.02	7,439,480	6,230,180	1,669,714	1,671,600	5.00	2.50	12.96	10.2
Otis Steel Co.	5.29	2.47	2,169,754	717,007	754,457	754,958	11.00	None	1.54	0.6
Alan Wood Steel Co.	3.78	5.12	1,051,772	1,210,202	503,027	503,027	10.00	7.50	2.75	3.5
Lukens Steel Co.§*	6.25	3.13	1,570,309	498,454	None	None	None	None	4.94	1.5
Sharon Steel Corp.	5.11	6.20	1,633,364	1,336,822	298,600	298,600	5.00	5.00	3.40	2.6
Allegheny Ludlum Steel Corp.	5.55	6.80	5,062,709	3,722,107	216,349	233,982	7.00	7.00	3.86	2.7
Granite City Steel Co.	2.57	2.70	479,247	315,259	None	None	None	None	1.25	0.8
Northwestern Steel & Wire Co.	3.93	2.26	446,160	174,054	5,250	5,250	7.00	14.00	2.70	1.6
Continental Steel Corp.	4.78	4.23	1,225,674	778,738	130,746	131,303	7.00	7.00	5.46	3.2
The Midvale Co.	....	..	3,304,050	3,227,737	None	None	None	None	5.51	16.1
Laclede Steel Co.	4.92	2.67	748,796	273,485	None	None	None	None	3.63	1.3
Keystone Steel & Wire Co.	10.29	9.45	1,815,413	1,295,185	None	None	None	None	2.40	1.7
Rustless Iron & Steel Corp.	9.10	11.02	2,332,298	1,275,993	91,291	91,291	2.50	2.50	2.42	1.2
Wickwire Spencer Steel Co.	....	....	1,578,463	13,768	None	None	None	None	3.44	0.0
Total (or average)	5.53	7.48	$295,043,182	$260,309,958	$45,742,588	$47,825,452	....	....	$6.94	$6.

*Loss.

†Payments on 7 per cent cumulative; on the 5 per cent cumulative, redeemed April 1, 1940, payments were 25 cents per share in 1940.

§§For fiscal year ending June 30.

**Includes treasury shares and share certificates not yet issued.

‡Includes 11,000 shares held in treasury allocated to stock options.

‡Payments on $5 cumulative convertible preferred. On 6 per cent cumulative preferred, payment in 1941 was $33, and in 1940 was $6.

††Payments on prior preferred 5.5 per cent. No dividends paid on class A, 5.5% and class B, 7%, during 1941 and 1940.

*†Payments on 6 per cent cumulative convertible preferred; payments per share on prior preference preferred were $6 in 1941 and 1940.

§§*Exact percentage figure not available. Estimated to have been at practical capacity.

§*Fiscal year ended Oct. 11, 1941 and Oct. 12, 1940.

"Net Income Before Dividends" columns and totals do not take into consideration requirements (not actual payments) for preferred dividends. In computing earnings per common share these totals, adjusted for preferred dividend requirements, are used. In arriving at earnings per common share for individual companies the same method is followed.

Boldface type is used under those columns in which figures from all 25 companies were not available.

1926....
1927....
1928....
1929....
1930....
*Los

Analysis of the Steel Industry for

l Returns from Twenty-five Producers, Representing Over 90 Per Cent of Total Ingot Capacity

	Funded Debt		Surplus		Total Capitalization		Total Income Before Dividends and Interest on Bonds	
	1941	1940	1941	1940	1941	1940	1941	1940
1,100	$181,238,442	$191,696,268	$400,514,241	$343,960,668	$1,599,917,799	$1,553,932,319	$122,204,473	$115,849
8,700	181,778,095	185,774,684	106,902,394	96,252,049	665,643,619	658,989,863	40,423,793	56,293
3,450	95,224,569	95,829,105	91,283,204	80,670,038	350,775,864	344,501,734	28,433,551	25,351
3,900	40,375,000	42,224,118	65,806,482	56,797,684	216,830,102	215,367,702	17,745,609	12,321
None	60,931,348	62,445,890	95,429,727	85,743,737	211,227,750	203,306,302	18,944,456	16,927
0,000	74,796,352	82,500,000	37,150,620	27,024,414	232,035,025	229,612,467	18,661,412	14,266
None	46,680,000	48,200,000	48,732,890	42,566,447	156,392,200	151,521,757	16,199,271	16,312
0,000	23,300,000	9,500,000	18,218,658	13,623,808	158,250,667	139,862,816	11,764,467	7,816
5,200	34,800,000	30,800,000	21,644,682	18,940,004	121,244,982	116,018,904	9,773,825	7,151
None	15,518,200	15,518,200	17,180,988	15,408,571	38,335,388	36,562,971	3,064,228	2,520
1,000	8,380,000	6,029,000	18,520,163	15,910,861	47,533,653	42,273,051	3,513,829	1,891
2,000	15,700,000	16,000,000	19,082,583	14,190,090	78,844,526	74,752,033	7,978,762	6,740
4,890	13,063,000	13,417,000	6,577,223	6,013,655	34,510,953	34,308,440	2,766,569	1,336
6,133	None	None	3,895,218	3,561,686	15,470,240	15,136,708	1,051,772	1,210
None	3,212,700	3,502,700	5,465,600	4,069,878	11,858,060	10,752,338	1,755,040	827
2,000	1,600,000	2,000,000	7,412,108	6,469,674	18,958,638	18,416,204	1,668,754	1,365
2,600	None	None	19,679,699	17,609,689	30,390,768	28,808,052	5,062,709	3,722
None	3,128,777	3,643,401	3,885,299	3,539,922	15,497,897	15,667,144	618,652	462
5,000	798,203	908,208	2,413,395	1,951,321	4,104,423	3,752,354	504,285	236
0,264	1,400,000	1,600,000	5,687,840	5,094,315	14,218,012	13,840,822	1,275,924	834
None	None	None	5,124,744	3,728,668	15,699,365	14,303,289	3,304,050	3,227
None	750,000	750,000	1,846,477	1,811,743	6,721,477	6,686,743	771,082	295
None	600,000	1,500,000	6,800,500	5,779,589	10,557,300	10,436,389	1,860,951	1,344
9,088	2,400,000	None	4,540,672	2,986,969	9,056,307	5,102,604	2,343,427	1,275
None	1,714,702	1,930,450	12,101,453	10,740,339	18,409,319	17,263,953	1,679,837	126
5,325	$807,389,388	$815,769,024	$1,025,896,860	$884,445,819	$4,082,484,334	$3,961,176,959	$323,370,728	$299,708

nds Paid Share eferred	Income Per Common Share		Dividends Paid Per Share on Common		Operating Rate Per Cent		Total Taxes		Total Assets	
1940	1941	1940	1941	1940	1941	1940	1941	1940	1941	1940
$7.00	$10.45	$8.84	$4.00	$4.00	§§*	80.2	$191,502,574	$85,420,545	$2,045,021,088	$1,854,585,741
5.25†	9.35	14.04	6.00	5.00	100.4	93.3	108,411,074	39,739,381	862,608,194	763,724,034
24.00*†	3.87	3.30	2.00	0.40	99.5	78.0	57,277,622	16,034,921	420,186,075	405,317,763
4.00	10.85	10.70	2.60	None	98.7	84.9	22,142,299	9,327,344	258,944,873	240,478,022
None	7.75	6.83	3.25	2.50	90.3	89.2	25,985,443	12,528,619	248,550,326	237,349,710
5.50	9.13	5.96	3.00	1.25	103.3	82.1	26.593.000	5,497.000	262,163,072	251,239,106
None	9.08	8.87	5.00	5.00	103.7	93.7	26,788,272	9,209,459	177,527,539	173,691,939
7.38	3.21	1.96	1.40	0.25	92.8	69.1	16,053,000	4,734,425	189,111,467	157,021,944
5.00§	11.71	6.64	2.00	None	99.9	85.2	10,521,674	4,001,714	132,861,390	130,064,944
None	4.06	3.10	1.00	None	78.9	72.2	2,331,344	1,664,594	47,075,157	42,937,493
None††	4.54	1.35	None	None	94.0	74.6	4,946,141	1,458,736	56,892,364	48,113,473
2.50	12.96	10.24	1.00	None	....	....	15,028,095	3,401,207	110,937,278	91,263,835
None	1.54	0.04*	None	None	100.3	85.1	3,388,465	1,099,716	38,866,865	38,106,077
7.50	2.75	3.54	None	None	69.7	53.5	2,019,885	1,169,651	19,227,876	18,351,786
None	4.94	1.57	0.50	None	74.4	60.1	1,280,059	377,770	15,672,819	13,614,755
5.00	3.40	2.64	1.00	0.25	107.7	94.6	3,138,322	829,487	22,902,870	21,013,193
7.00	3.86	2.77	2.25	1.50	77.8	56.9	11,431,656	3,799,608	43,688,145	37,891,386
None	1.25	0.82	0.35	0.25	105.1	73.5	548,793	307,705	17,353,905	17,345,495
14.00	2.70	1.03	None	None	40.1	37.4	472,484	166,750	5,676,226	5,550,918
7.00	5.46	3.23	2.50	1.50	95.4	95.2	1,335,320	807,000	17,254,172	16,584,314
None	5.51	16.14	3.83	9.00	§§*	47.9	7,644,958	4,221,718	29,984,978	23,085,283
None	3.63	1.33	2.25	1.25	§§*	78.1	945,000	267,086	8,538,328	8,070,109
None	2.40	1.71	1.05	1.00	111.1	100.0	1,454,126	629,326	11,833,308	12,653,450
2.50	2.42	1.28	0.60	0.60	....	....	5,785,244	1,465,182	15,469,955	9,795,711
None	3.44	0.03	0.50	None	99.2	72.5	929,446	435,570	20,198,312	18,476,770
....	$6.94	$6.11	....	....	....	....	$547,954,296	$208,594,514	$5,078,546,582	$4,636,327,251

PER CENT EARNED ON CAPITALIZATION

1926	6.96	1931	0.40	1936	4.40
1927	5.22	1932	2.85*	1937	6.07
1928	6.55	1933	0.90*	1938	0.59
1929	9.88	1934	0.36	1939	4.27
1930	4.54	1935	2.09	1940	7.57
*Loss.				1941	7.93

r 1941

come nds and Bonds 1940	Per Cent Total Income on Capitalization 1941	1940	Net Sales 1941	1940	
$115,849,432	7.64	7.46	.....	.....	.....United States Steel Corp.
56,293,656	6.07	8.54	$961,240,737	$602,202,618	.....Bethlehem Steel Corp.
25,351,588	8.11	7.36	480,542,106	303,303,447	.....Republic Steel Corp.
12,321,340	8.19	5.74	216,009,805	153,286,929	.....Jones & Laughlin Steel Corp.
16,927,205	8.97	8.33	200,575,863	157,905,721	.....National Steel Corp.
14,266,613	8.04	6.21	226,215,430	143,054,028	....Youngstown Sheet & Tube Co.
16,312,398	10.36	10.77	202,755,157	142,173,338	.....Inland Steel Co.
7,816,244	7.43	5.59	169,178,239	112,363,529	.....American Rolling Mill Co.
7,151,650	8.06	6.16	131,205,180	93,095,627	.....Wheeling Steel Corp.
2,520,779	7.99	6.89	39,241,034	31,864,811	.....Colorado Fuel & Iron Corp.
1,891,368	7.39	4.47	61,453,985	34,798,430	.....Pittsburgh Steel Co.
6,740,664	10.02	9.02	127,753,668	77,689,477	.....Crucible Steel Co. of America
1,336,856	8.02	3.90	41,013,176	29,072,621	.....Otis Steel Co.
1,210,202	6.80	8.00	27,831,929	23,625,563	.....Alan Wood Steel Co.
827,114	14.80	7.69	25,138,582	15,902,649	.....Lukens Steel Co.
1,365,246	8.80	7.41	31,948,516	21,573,295	.....Sharon Steel Corp.
3,722,107	16.66	12.92	91,217,999	54,702,998	.....Allegheny Ludlum Steel Corp.
462,987	3.99	2.96	18,682,210	11,647,814	.....Granite City Steel Co.
236,827	12.29	6.31	11,356,822	7,713,275	....Northwestern Steel & Wire Co.
834,988	8.97	6.03	25,653,651	18,426,391	.....Continental Steel Corp.
3,227,737	21.05	22.57	.....	.....	.....The Midvale Co.
295,771	11.47	4.42	15,213,984	10,242,815	.....Laclede Steel Co.
1,344,014	17.63	12.88	17,644,559	13,698,303	..... Keystone Steel & Wire Co.
1,275,993	25.88	25.01	25,625,376	11,583,924	.....Rustless Iron & Steel Corp.
126,042	8.57	0.79	.....	.....	.....Wickwire Spencer Steel Co.
$299,708,821	7.92	7.57	**$3,147,498,008**	**$2,069,927,608**	.....Total (or average)

0	Current Assets 1941	1940	Current Liabilities 1941	1940	
35,741	$783,460,857	$634,634,454	$287,666,561	$163,304,305	..... United States Steel Corp.
24,034	388,819,038	287,322,031	176,330,402	91,619,927	..... Bethlehem Steel Corp.
17,763	156,441,142	141,765,593	45,600,106	35,775,031	..... Republic Steel Corp.
78,022	100,983,425	80,396,220	33,879,227	18,883,701	.... Jones & Laughlin Steel Corp.
49,710	71,126,593	69,177,571	32,120,387	29,620,158	..... National Steel Corp.
39,106	111,152.352	95,517.039	23,055,513	17,139,576	....Youngstown Sheet & Tube Co.
91,939	74,449,161	66,895,053	14,343,355	16,535,893	..... Inland Steel Co.
21,944	83,600.189	64,776,580	27,797,957	15,307,388	..... American Rolling Mill Co.
54,944	52,592,725	49,281,800	9,027,258	11,982,207	..... Wheeling Steel Corp.
17,493	19,896,098	16,984,997	5,743,038	3,623,828	..... Colorado Fuel & Iron Corp.
13,473	21,158,003	18,140,182	8,459,928	4,991,000	..... Pittsburgh Steel Co.
53,835	60,257,286	41,843,738	25,701,697	10,338,487	.... Crucible Steel Co. of America
06,077	14,711,495	13,135,310	3,209,788	2,821,094	..... Otis Steel Co.
51,786	8,671,614	8,365,638	3,266,934	2,524,224	..... Alan Wood Steel Co.
14,755	7,243,271	4,642,934	4,601,225	2,938,514	..... Lukens Steel Co.
13,193	11,619,479	10,759,625	3,619,232	2,219,989	.....Sharon Steel Corp.
31,386	25,009,609	21,127,294	12,480,932	8,285,069	.... Allegheny Ludlum Steel Corp.
55,495	6,841,007	6,470,818	1,624,532	1,451,656	..... Granite City Steel Co.
50,918	1,843,729	2,072,451	1,097,386	1,174,891	... Northwestern Steel & Wire Co.
04,314	8,890,616	8,016,019	1,980,654	1,713,677	..... Continental Steel Corp.
55,283	22,634,202	15,806,274	11,375,622	6,668,998	....The Midvale Co.
70,109	4,509,550	3,979,248	1,480,351	1,249,082	..... Laclede Steel Co.
33,450	4,169,798	5,534,076	1,128,290	2,075,933	..... Keystone Steel & Wire Co.
55,711	9,153,633	4,774,580	5,416,695	2,644,676	..... Rustless Iron & Steel Corp.
56,770	9,025,649	7,482,988	1,602,361	927,334	..... Wickwire Spencer Steel Co.
37,251	$2,058,260,524	$1,678,902,513	$742,609,431	$455,816,638	.....Total (or average)

"Tool Engineering—Key to Victory" Draws Over 600 to St. Louis Convention

By GUY HUBBARD
Machine Tool Editor

ANY misgivings which may have existed as to the possible adverse effect of wartime conditions on attendance, were completely wiped out when more than 600 delegates appeared at the tenth anniversary meeting of American Society of Tool Engineers. This meeting, held at Hotel Jefferson, St. Louis, March 28, 29 and 30, drew members from Texas, California and Canadian industrial centers—as well as from New England, New York, Middle Atlantic and mid-western states.

Importance of the sessions to the war production program was testified to by presence of such men as Rear Admiral John Downes, commandant, ninth naval district; Brigadier General K. B. Wolfe, chief, production engineering section, Army Air Corps; and Col. R. E. Hardy, deputy chief, St. Louis Ordnance district. Recognition of the caliber of the meeting by the city of St. Louis was indicated clearly by the generous newspaper publicity and by admission of delegates to vital defense plants in the city.

Substitutes Run Short

In keeping with the slogan, "Tool Engineering—Key to Victory," all sessions were devoted to important phases of war production, including substitution of materials; plant conversion; cutting tool conservation; inspection; employment; and mass production of aircraft.

Regarding the materials situation, Dr. David R. Kellogg, assistant manager, engineering laboratories and standards department, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., said: "The war material shortage has about reached the point where substitutes must be found for substitutes, and only through ingenuity and constant experimentation can solutions be found.

"Even plastics, which have been widely heralded as the answer to 'the maiden's prayer' are turning out to be somewhat of a disappointment. There are severe shortages of those materials used to make the synthetic resins, making it impossible now for industry in general to utilize plastics to the extent which otherwise would be the case."

Dr. Kellogg warned tool engineers that there are no materials which can be considered as universal substitutes for any of the more critical materials. Every case must be considered separately and on its own merits.

In conclusion, he said: "Two requirements for dealing with problems of substitutions and material shortages are—a crystal ball to be used in prognosticating what materials next are going to be short, and manual dexterity in crossing the fingers to ward off the 'hex' of sudden unavailability of chosen substitute materials."

Clifford Ives, state director, War Production Board, Milwaukee, emphasized that required boosting of war production in 1942 depends more on the efforts of tool engineers

Otto W. Winter
Elected President, American Society of Tool Engineers

in converting and increasing production of existing machine tools, then it does on new machine tools—even though the machine tool industry shows every evidence of turning out $1,500,000,000 worth this year. Bottlenecks which now threaten, he said, are in heat treating equipment and steel casting and forging capacity. He urged that these facilities be employed with fully as much efficiency as machine tools.

At the same session, Hugh H. C. Weed, vice president, Carter Carburetor Co., St. Louis, whose plant was one of those inspected by the delegates, told how his organization has met conversion problems. Cutting red tape and teamwork are prime essentials, he said. As he sees the situation, ships and tools are the elements which now are most vital to success in the war.

As far as getting speed on government orders is concerned, Mr. Weed said that he who makes his existing equipment produce to the maximum will have no difficulty—on the basis of that record—in getting additional necessary equipment with governmental help. He urged careful selection of subcontractors, to make sure that their work will pass muster and be delivered on time. "Don't overlook unsuspected sources," he added.

In opening the session on cutting tool conservation, Ernest Clark, President, Clark Equipment Co., St. Louis, said that in his estimation too much emphasis is being placed on the machine tool and not enough on the cutting tool. The best brains in the plant, he added are none too good now to be devoting a lot of attention to tool design, tool salvage and cutting fluid selection and use.

How To Design Tools

A. H. d'Arcambal, vice president, Pratt & Whitney, Division, Niles-Bement-Pond Co., Hartford, Conn., then showed by slides and by samples how tools should be designed to suit particular materials and conditions. He urged that the tool supplier be given all data on the job so that proper selection could be made, and also urged that company representatives be called in consultation when tooling up. Two things upon which he bore down heavily were: Necessity for a central tool grinding department in every shop of any size; and desirability of a nation-wide check up on speeds and feeds because of the fact that high speed steel tools generally are not being run anywhere near to their maximum capacity.

At the same session, L. W. Lang, National Tool Salvage Co., Detroit, demonstrated what can and cannot be done in renewing and converting worn tools by grinding to new sizes and shapes. This work, done largely by equipment of special design, involves redressing of shanks and complete redressing of teeth. In some cases plain mills can be changed to side mills, but existing form of relieved teeth cannot be altered, nor can size and thread of taps be changed.

Prof. O. W. Boston, University of Michigan, Ann Arbor, cited the fact that the Navy expects that through scientific selection of tools and cutting fluids it may be possible to double production on its existing equipment. "Probably it can be done," said the professor, as he proceeded to show what has been accomplished in his laboratory in this direction—especially in the study of increased rakes and clearances on tools and compounding of coolants to suit materials and setups.

Certain mysteries of Ordnance Department inspection were cleared up by First Lt. A. R. Burgess of the St. Louis District Ordnance Office, by showing the terrific "beating" to which ordnance *materiel* is subjected. He mentioned the case of the

inventor of a new fuze who complained bitterly when the ordnance officer threw it out of a fourth story window before testing its functioning. "What was that ordeal," said Lt. Burgess, "compared to the wallop the fuse would get when accelerated from 0 to 3000 feet per second in an 8-foot gun barrel?" One of the important reasons for insistence on perfection in *materiel* is one of fighter morale. Premature explosion of a defective shell in a gun has far more serious effects in the front lines than a burst within the lines of a shell thrown over by the enemy. The defective shell indicates that those behind the lines are "letting the boys down" through sloppy workmanship.

Successful solution of the employment problem—particularly through use of women—hinges largely on ability of tool engineers to break down operations into simpler units, according to F. E. Allison, chief inspector, Wagner Electric Co., St. Louis. For example, if a turret lathe is not to be had, a number of new workers can be trained quickly to do the same job on several engine lathes—each one doing one or two of the operations which would be accomplished through multiple tooling on the more complicated machine.

As far as women workers in the shop are concerned, Mr. Allison urged that a little extra patience be exercised in training them; that their surroundings be made as quiet and pleasant as possible; and that their ability as inspectors not be overlooked. "Bear in mind that most of them are faced with new and unusual conditions in a machine shop," he said, "so do everything possible right from the beginning to put them at ease."

Machine Methods Won

While Brigadier General K. B. Wolfe's remarks mainly were "off the record," it can be said that he gave credit to America's leadership in interchangeable manufacturing for the recent brilliantly successful surprise attack of General MacArthur's air force on the unsuspecting Japanese in Manila Bay. Because of this interchangeability, American air force mechanics, hidden in the jungle, were able to exchange parts until they had assembled a number of operating planes from a collection of wrecks. Otherwise—without elaborate machine shop facilities—such a feat would have been wholly impossible, and that fleet of American planes could not have been "conjured out of nowhere" as it seemed to the Japanese they must have been.

New officers of ASTE for 1942-43, installed during the banquet on Friday evening, are: President, Otto W. Winter, vice president in charge of manufacturing, Republic Drill & Tool Co., Chicago; first vice president, Ray H. Morris, vice president, Hardinge Bros. Inc., Elmira, N. Y.; and second vice president, Douglas D. Burnside, superintendent, American Stove Co., St. Louis.

Announcement also was made of appointment of Adrian L. Potter as executive secretary. Mr. Potter, who will make his headquarters in Detroit, comes from Springfield, Mass., where he has had many years of experience as an association executive. He succeeds to a position which has remained unfilled since the death last October of Ford R. Lam, who had managed the affairs of the ASTE since its establishment ten years ago.

Employers Comment on Work Schedules

Gang No. 1-Week beginning March 22

MACHINE NO.	TIME	SUN.	MON.	TUE.	WED.	THU.	FRI.	SAT.
1	7-3	(32)	44	44	44	44	44	44
	3-11	37	(32)	37	37	37	37	37
	11-7	22	22	22	(32)	22	22	22
3	7-3	39	39	39	39	39	39	(32)
	3-11	63	63	(32)	63	63	63	63
	11-7	36	36	36	36	(32)	36	36

More Pay, Greater Output

To the Editor:

Herewith is a chart which we have worked out to solve our own problem of the 168 hour week.

We have found that 48 hours is the most practical work week for us, partly due to the fact that we do not have enough skilled men available for a 40 hour week, and partly due to the fact that our men want the 8 hours overtime. We have also found that 48 hours is about all that a man can stand.

The plan formulated, as you will see, provides for seven men to operate two machines, thereby giving the men 48 hours, machines 168 hours.

PAULSEN SPENCE,
President, Spence Engr. Co., Walden, N. Y.

Explanation: Machines numbered 1 and 3 operate continuously on three 8-hour shifts each, the first shift starting at 7 o'clock and ending at 3 o'clock. Machine No. 1 is manned first on Sunday by worker No. 32 who is relief man for the regular 3-man crews of the two machines. After his Sunday turn, worker No. 32 accumulates the remaining 40 hours of his 48-hour week, relieving No. 37 on Monday from 3 to 11, No. 22 on Wednesday from 11 to 7, etc. The other six men work fixed shifts of six 8-hour days per week.

48-Hour Week Most Practical

To the Editor:

Several times recently the President has said that the Wage-Hour law does not restrict our possible war effort because the employer has only to pay 1½ wages for time over 40 hours per week to get his employes to work the additional hours.

He stated that most producers were doing that to increase production, and he did not want to favor any change in the Wage-Hour law that would operate to reduce the weekly pay of workers.

The President is obviously not well informed.

According to United States Department of Labor and National Industrial Conference Board reports—both reporting on an overwhelming majority of employers—the average weekly hours worked equals 42.4 hours.

At this rate a man earning $1 per hour would receive $40, plus $3.20; which gives a total of $43.20 per week.

If the work week at straight time was raised to 48 hours that same man working full time would earn $48 per week.

Assuming equal efficiency each man would receive more money, and the war production, per man, would be increased as 48 divided by 42.4, or 13 per cent.

Such a change in the Wage-Hour law would increase the worker's income and increase his production, at no increase in the cost of war goods.

J. W. JESSOP
President, Ohio Electric Mfg. Co., Cleveland.

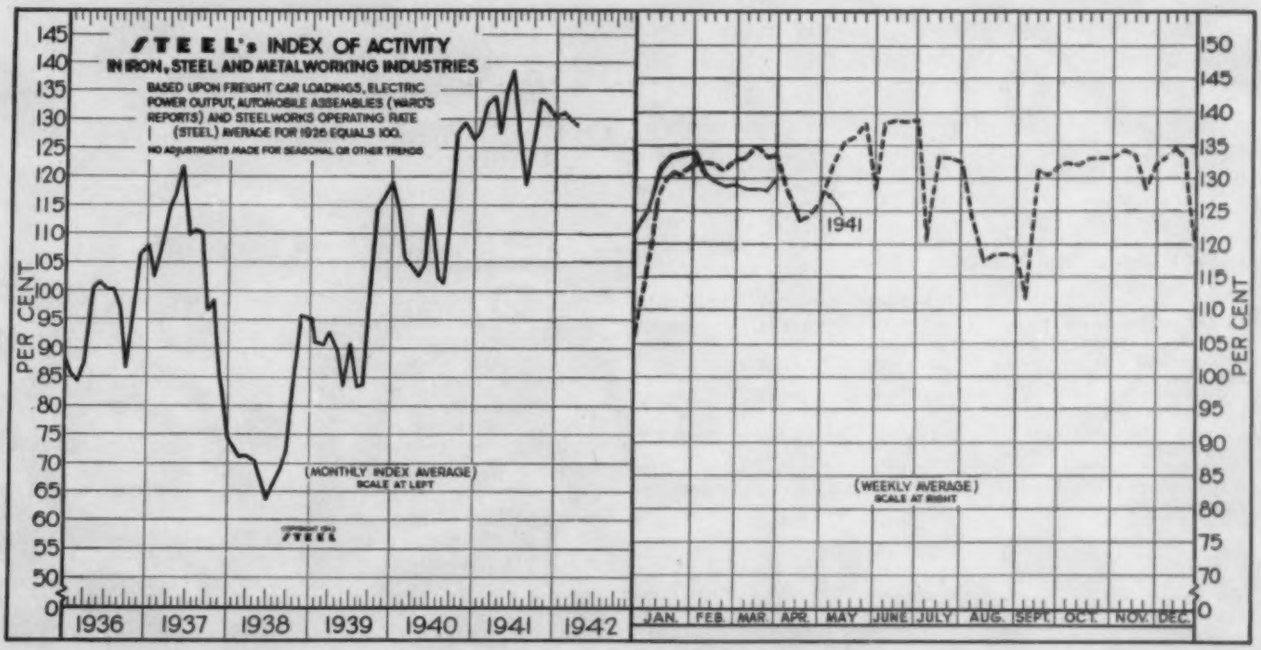
The *BUSINESS TREND*

War Output Offsets Civilian Goods Decline

INDUSTRIAL activity continues to follow the pattern of recent weeks as accelerated production of war materials offsets a steady shrinkage in civilian goods output. Latest reports indicate a slight expansion in total industrial production.

Increased output is attributed more to the operations of new plants than to the conversion of those formerly producing civilian goods. However, the changeover of civilian goods' plants to war production continues to gain momentum. Notable example of this is illustrated in a recent survey of the Detroit area. Industrial unemployment in the automotive center dropped from a peak of 125,000 in February to about 70,000 by the latter part of March. For the country as a whole, it is estimated that employment in war industries now totals over 8,200,000. In contrast with this the United States Bureau of Labor estimated an average of 5,300,000 were engaged in war work during the final quarter of last year. To further accelerate the conversion to war goods output, the RFC has announced a program whereby small concerns may obtain loans up to $100,000 for war work.

Production indices of leading industries recorded little variation throughout March but in practically every instance showed a marked increase over that


STEEL's INDEX OF ACTIVITY
IN IRON, STEEL AND METALWORKING INDUSTRIES
BASED UPON FREIGHT CAR LOADINGS, ELECTRIC POWER OUTPUT, AUTOMOBILE ASSEMBLIES (WARD'S REPORTS) AND STEELWORKS OPERATING RATE (STEEL) AVERAGE FOR 1926 EQUALS 100.
NO ADJUSTMENTS MADE FOR SEASONAL OR OTHER TRENDS
PER CENT
(MONTHLY INDEX AVERAGE) SCALE AT LEFT
(WEEKLY AVERAGE) SCALE AT RIGHT
1941
1936 1937 1938 1939 1940 1941 1942
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.

STEEL'S index of activity gained 1.7 points to 129.8 in the week ended March 28:

Week Ended	1942	1941
Jan. 17	133.1	130.8
Jan. 24	133.7	130.7
Jan. 31	133.9	132.0
Feb. 7	130.6	132.7
Feb. 14	129.8	132.3
Feb. 21	129.0	131.2
Feb. 28	129.1	133.0
Mar. 7	128.3	133.1
Mar. 14	128.3	135.0
Mar. 21	128.1	133.5
Mar. 28	129.8	133.9

Mo. Data	1942	1941	1940	1939	1938	1937	1936	1935	1934	1933	1932	1931
Jan.	131.3	127.3	114.7	91.1	73.3	102.9	85.9	74.2	58.8	48.6	54.6	69.1
Feb.	129.6	132.3	105.8	90.8	71.1	106.8	84.3	82.0	73.9	48.2	55.3	75.5
March	128.6	133.9	104.1	92.6	71.2	114.4	87.7	83.1	78.9	44.5	54.2	80.4
April	.....	127.2	102.7	89.8	70.8	116.6	100.8	85.0	83.6	52.4	52.8	81.0
May	.....	134.8	104.6	83.4	67.4	121.7	101.8	81.8	83.7	63.5	54.8	78.6
June	.....	138.7	114.1	90.9	63.4	109.9	100.3	77.4	80.6	70.3	51.4	72.1
July	.....	128.7	102.4	83.5	66.2	110.4	100.1	75.3	63.7	77.1	47.1	67.3
Aug.	.....	118.1	101.1	83.9	68.7	110.0	97.1	76.7	63.0	74.1	45.0	67.4
Sept.	.....	126.4	113.5	98.0	72.5	96.8	86.7	69.7	56.9	68.0	46.5	64.3
Oct.	.....	133.1	127.8	114.9	83.6	98.1	94.8	77.0	56.4	63.1	48.4	59.2
Nov.	.....	132.2	129.5	116.2	95.9	84.1	106.4	88.1	54.9	52.8	47.5	54.4
Dec.	.....	130.2	126.3	118.9	95.1	74.7	107.6	88.2	58.9	54.0	46.2	51.3

recorded in the same period a year ago.

The national steel rate fluctuated between the narrow limits of 95.5 and 97.5 throughout the first quarter. Steel ingot output advanced 2 points during the last week of March to 97.5 per cent. This represents the sharpest gain recorded this year and compares with 99.5 per cent registered in the corresponding period in 1941. Freer movement of scrap, resulting from more intensified collection efforts and milder weather was the chief factor in bolstering steelmaking operations during the latter part of March.

Where Business Stands

Monthly Averages 1941 = 100

	Feb., 1942	Jan., 1942	Feb., 1941
Steel Ingot Output	102.6	101.2	98.1
Pig Iron Output	105.0	104.4	98.1
Building Construction	86.6	63.3	54.0
Freight Movement	96.0	94.8	88.1
Wholesale Prices	110.8	109.2	92.3

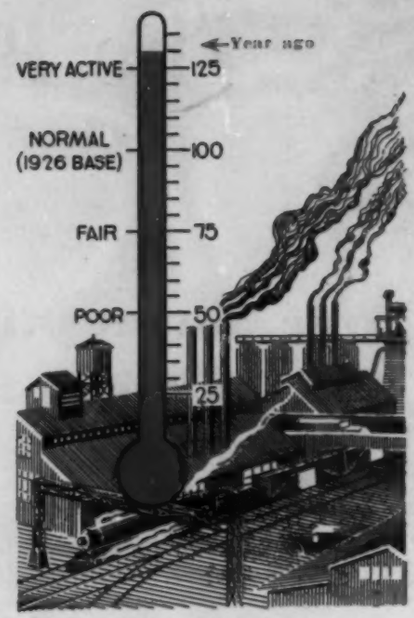
Truck production in United States and automobile and truck assemblies in Canada totaled 28,915 units during the period ended March 28 or substantially unchanged from the preceding week. Electric power consumption declined to 3,345,502,000 kilowatts during the week ended March 28. Reflecting increased movement of iron ore and coal, revenue freight carloadings advanced to an estimated total of 835,000 cars in the latest period.

Machine tool production during March is estimated to have reached an all-time peak. Output in February held substantially unchanged from the January total despite the shorter month. Industry's production goal of $1,500,000,000 for this coming year will likely be attained.

Industrial Weather

TREND:

Sidewise



During the latest week, STEEL's Index of Activity advanced 1.7 points to 129.8, reflecting an upward tendency in freight carloadings and steelmaking operations. A year ago the Index stood at 133.9. In March the Index averaged 128.6, compared with 129.6 in the preceding month and 133.9 for March, 1941.

The Barometer of Business

Financial Indicators

	Feb., 1942	Jan., 1942	Feb., 1941
30 Industrial stocks†	107.28	111.11	121.68
20 Rail stocks†	27.85	28.01	27.54
15 Utilities†	13.83	14.41	19.37
Average price of all listed bonds (N.Y.S.E.)	$95.13	$95.24	$92.72
Bank clear'gs, daily average (000 omitted)	$1,181,974	$1,210,900	$1,031,209
Commercial paper, interest rate (4-6 months)	0.56	0.56	0.56
*Com'l. loans (000 omitted)	$11,374,000	$11,241,000	$9,495,000
Federal Reserve ratio (per cent)	90.6	90.8	91.0
Capital flotations (000 omitted)			
New Capital	$122,021	$181,760	$92,226
Refunding	$56,508	$151,478	$271,756
Federal gross debt, (mil. of dol.)	$62,381	$60,012	$46,117
Railroad earnings‡	$68,966,000	$80,548,607	$62,017,000
Stock sales, New York stock exchange	7,925,761	12,993,665	8,969,195

*Leading member banks Federal Reserve System.
†Dow-Jones Series.
‡January, December and January respectively.

Commodity Prices

	Feb., 1942	Jan., 1942	Feb., 1941
STEEL's composite finished steel price average	$56.73	$56.73	$56.73
U. S. Bureau of Labor's index	96.7	96.0	80.6
Wheat, cash (bushel)	$1.293	$1.308	$0.888
Corn, cash (bushel)	$0.98	$0.83	$0.69

Industrial Indicators

	Feb., 1942	Jan., 1942	Feb., 1941
Pig iron output (daily average, tons)	160,856	159,961	150,244
Iron and steel scrap consumption (tons)	4,276,000	4,590,000	4,172,000
Gear Sales Index	353	288	262
Foundry equipment new order index	567.9	532.7	361.4
Finished steel shipments (Net tons)	1,616,587	1,738,893	1,548,451
Ingot output (average weekly; net tons)	1,631,278	1,609,334	1,559,475
Dodge bldg. awards in 37 states ($ Valuation)	$433,557,000	$316,846,000	$270,373,000
Fabricated structural steel shipments (Tons)	153,732	158,880	161,354
Steel castings output (Net Tons)	134,778	131,518	94,409
Coal output, tons	43,840,000	48,540,000	41,695,000
Business failures; number	916	962	1,129
Business failures; liabilities	$9,631,000	$9,916,000	$13,483,000
U. S. Dept. of Labor (90 industries, factory):			
Av. wkly. hrs. per worker†	41.5	41.2	39.0
Av. weekly earnings†	$35.10	$27.71	$33.68
Cement production, bbls.	10,183,000	12,429,000	8,345,000
Cotton consumption, bales	893,745	945,909	793,428
Freight Car Awards	11,725	4,253	5,508
Car loadings (weekly av.)	780,692	771,284	716,634

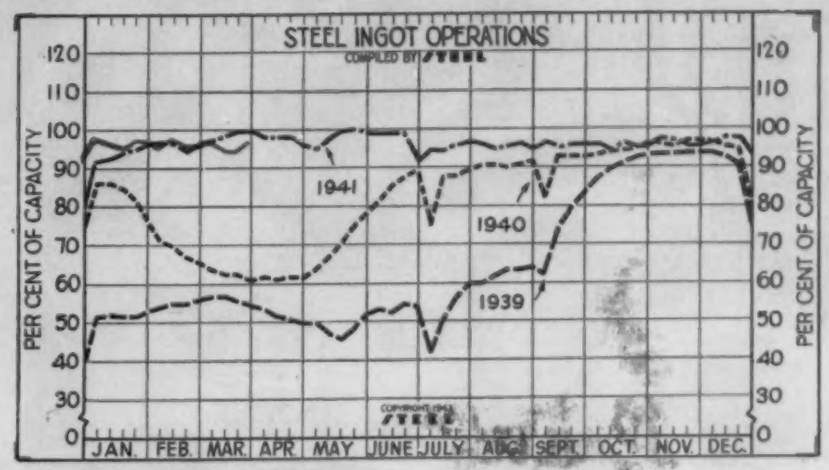
†January, December and January respectively.

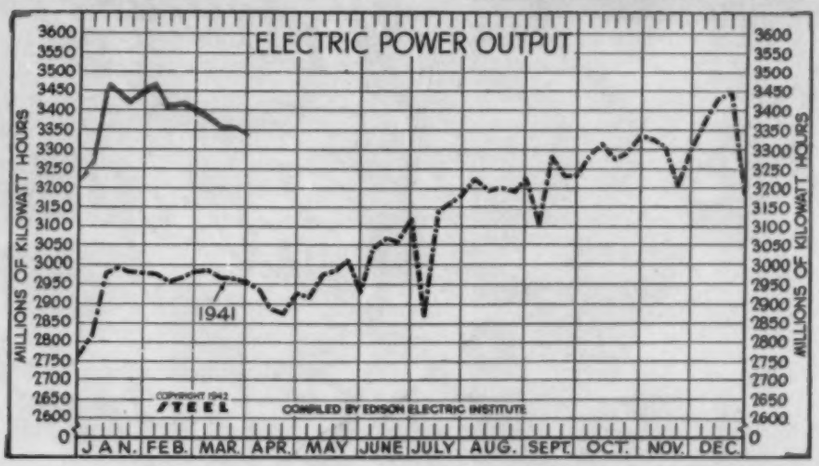
Steel Ingot Operations

(Per Cent)

Week ended	1942	1941	1940	1939
Mar. 28....	97.5	99.5	61.0	54.5
Mar. 21....	95.5	99.5	62.5	55.5
Mar. 14....	95.5	98.5	62.5	56.5
Mar. 7.....	96.5	97.5	63.5	56.5
Feb. 28....	96.0	96.5	65.5	56.0
Feb. 21....	96.0†	94.5	67.0	55.0
Feb. 14....	97.0	96.5	69.0	55.0
Feb. 7....	96.0	97.0	71.0	54.0
Jan. 31....	97.0	97.0	76.5	53.0
Jan. 24....	97.0	95.5	81.5	51.5
Jan. 17....	96.0	94.5	84.5	51.5
Jan. 10....	96.5	93.0	86.0	52.0
Jan. 3....	97.5	92.5	86.5	51.5
Week ended	**1941**	**1940**	**1939**	**1938**
Dec. 27....	93.5	80.0	75.5	40.0

†Since Feb. 21 rate is based on new capacity figures as of Dec. 31 last.




ELECTRIC POWER OUTPUT
MILLIONS OF KILOWATT HOURS
1941
COMPILED BY EDISON ELECTRIC INSTITUTE
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.

Electric Power Output

(Million KWH)

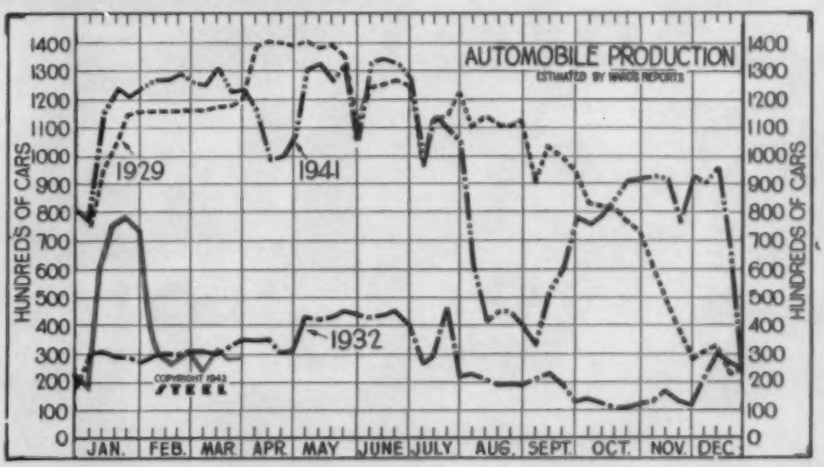
Week ended	1942	1941	1940	1939
Mar. 28	3,346	2,956	2,524	2,272
Mar. 21.....	3,357	2,964	2,508	2,258
Mar. 14.....	3,357	2,965	2,550	2,276
Mar. 7.....	3,392	2,987	2,553	2,285
Feb. 28.....	3,410	2,982	2,568	2,294
Feb. 21.....	3,424	2,968	2,547	2,269
Feb. 14.....	3,422	2,959	2,565	2,297
Feb. 7.....	3,475	2,973	2,616	2,315
Jan. 31.....	2,468	2,978	2,633	2,327
Jan. 24.....	3,440	2,980	2,661	2,340
Jan. 17.....	3,450	2,996	2,674	2,342
Jan. 10.....	3,473	2,985	2,688	2,329
Jan. 3.....	3,287	2,831	2,558	2,239
Week ended	**1941**	**1940**	**1939**	**1938**
Dec. 27	3,234	2,757	2,465	2,175
Dec. 20	3,449	3,052	2,712	2,425
Dec. 13.....	3,431	3,004	2,674	2,390

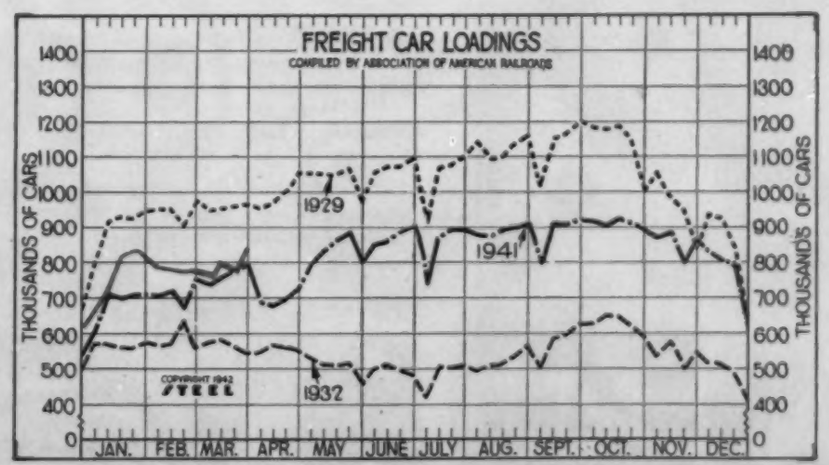
Auto Production

(1000 Units)

Week ended	1942	1941	1940	1939
Mar. 28....	28.9	124.2	103.4	86.0
Mar. 21....	28.9	123.8	103.4	89.4
Mar. 14....	30.6	131.6	105.7	86.7
Mar. 7	24.5	125.9	103.6	84.1
Feb. 28....	30.1	126.6	100.9	78.7
Feb. 21....	25.7†	129.2	102.7	75.7
Feb. 14....	29.8	127.5	95.1	79.9
Feb. 7....	37.1	127.7	96.0	84.5
Jan. 31....	73.3	124.4	101.2	79.4
Jan. 24....	79.9	121.9	106.4	89.2
Jan. 17....	75.0	124.0	108.5	90.2
Jan. 10....	59.0	115.9	111.3	86.9
Jan. 3....	18.5	76.7	87.5	76.7
Week ended	**1941**	**1940**	**1939**	**1938**
Dec. 27....	24.6	81.3	89.4	75.2
Dec. 20....	65.9	125.4	117.7	92.9
Dec. 13....	96.0	125.6	118.4	102.9

†Canadian trucks and automobiles and United States trucks, since Feb. 21.



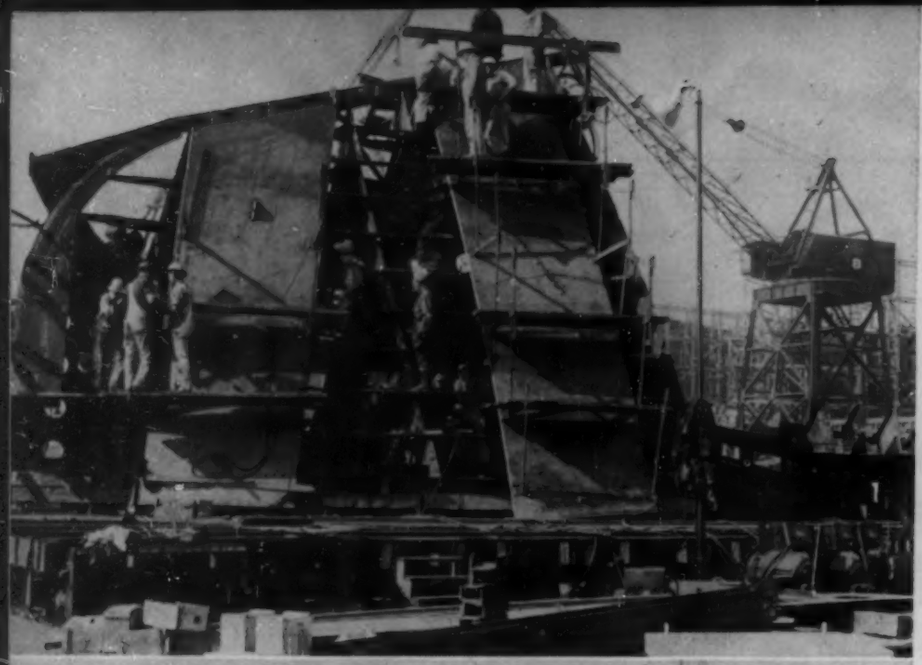


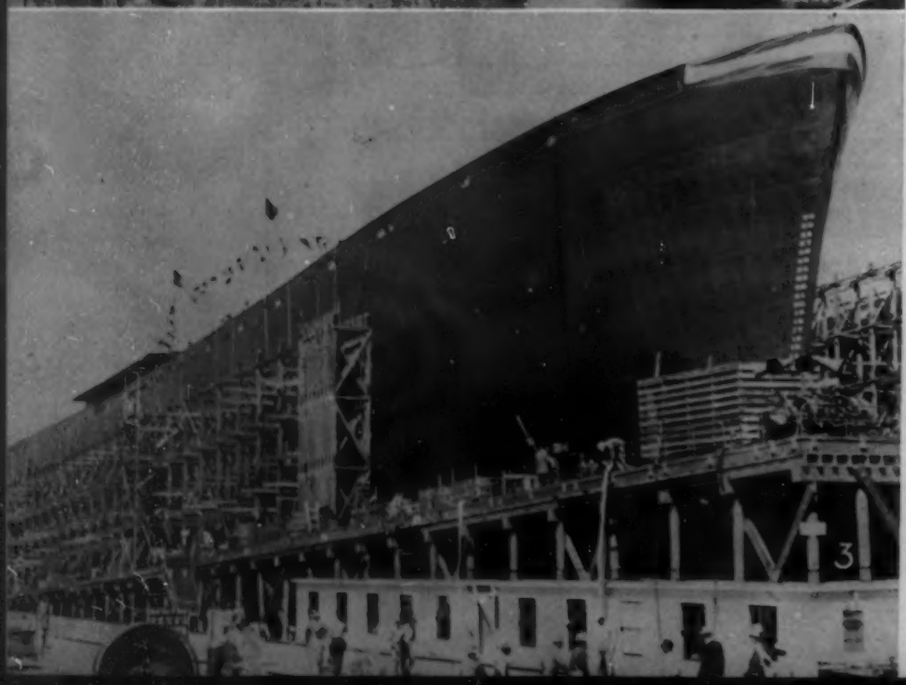
Freight Car Loadings

(1000 Cars)

Week ended	1942	1941	1940	1939
Mar. 28.....	835†	792	628	604
Mar. 21.....	797	769	620	605
Mar. 14	799	759	619	595
Mar. 7.....	771	742	621	592
Feb. 28.....	781	757	634	599
Feb. 21.....	775	678	595	561
Feb. 14.....	783	721	608	580
Feb. 7.....	784	710	627	580
Jan. 31.....	816	714	657	577
Jan. 24.....	818	711	649	594
Jan. 17.....	811	703	646	590
Jan. 10.....	737	712	668	587
Jan. 3.....	674	614	592	531

†Preliminary.





Straight-Line Production of *Liberty Cargo Ships*

★

By J. A. CORLETT
Los Angeles Office
General Electric Co.

★

Fig. 1—Bow or fore-peak subassembly being completed as a separate unit. Note line of arc welding sets at lower right, huge crane in background for handling completed subassemblies

Fig. 2—A group of 4-operator resistor stations. Cargo ship is nearing completion, hatches and deck equipment being placed here

Fig. 3—The 10,000-ton marine freighter is seen here preparatory to launching in the yards of the California Shipbuilding Corp., Los Angeles

TO GAIN all possible speed in the feverish race against time, a combination of two of the world's best production methods is being used by the California Shipbuilding Corp., Los Angeles, builders of Liberty cargo ships.

First, the yard and ways are laid out to permit orderly progression of both work and material from start to finish. Second, arc welding is used almost exclusively as the method of fabricating all steel work. Sufficient arc-welding equipment is installed at this yard to keep over 3000 men operating more than 1000 welding arcs 24 hours a day.

The first step in the building of these Liberty ships is to unload the steel from the railway siding into the plate shop, where it is cut and formed. Here, also, some of the smaller subassemblies such as ribs, Fig. 4, and bow substructures are fabricated with the aid of both 200-ampere and 400-ampere direct-current single-operator arc welders, the former being used largely for tacking.

From the plate shop, material moves upon assembly platforms where the major subassemblies are fabricated. Bow assemblies are erected in an inverted position as illustrated in Fig. 1. Rib sections, deck sections and bulkheads also are fabricated on these assembly platforms with the aid of individual 300-ampere arc welding sets.

Progressing to the shipways, the subassemblies are erected and the hull takes shape. The bottom and false bottom are laid on the ways, Fig. 5, after which sides and bulkheads are erected, Fig. 6. Here the greater part of the welding current is furnished by multiple-operator direct current arc welders located beneath the ways in a neat, clean generator room. Fig. 7 shows a typical installation of six motor-generator sets.

Decks and hatchways are then installed to complete the hull and make ready for launching. Portable adjustable resistor sets, Fig. 2, are used with multiple-operator arc-welding systems to permit operators to increase or decrease welding current to suit their needs. Each resistor station provides control for four arcs.

Finally, another Liberty ship is ready to be outfitted and join the fast growing fleet, Fig. 3. It has been estimated that approximately 35 miles of arc-welded joints are made by manual operation and more than 7½ miles by automatic operation in building each carrier.

Fig. 4—Single-operator motor-generator arc welding sets in the plate shop of the California Shipbuilding Corp., Los Angeles. Here rib subassemblies are being welded

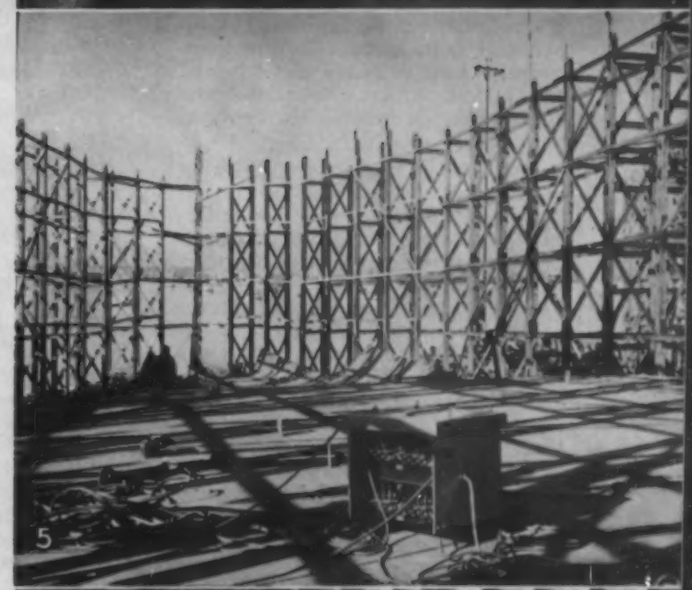


Fig. 5—Portable 4-operator 150/200-ampere resistor station used in welding the false bottom of Liberty cargo ship

Fig. 6—Bulkheads are being put in place and side is being built up here. Portable resistor stations used with multiple-operator generator sets give individual control of arc current at each welding station

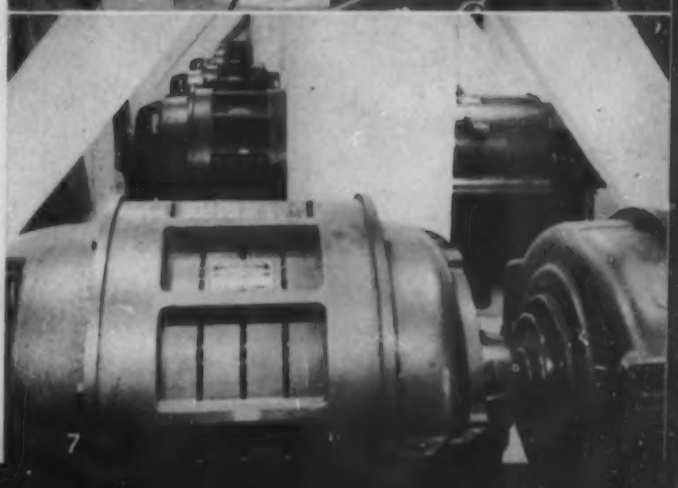


Fig. 7—Row of six 1500-ampere constant-potential motor-generator sets (synchronous motor driven) are mounted in generator room under shipway. With portable resistor stations, these provide current to arc welders and offer individual current adjustment

PROPERTIES OF

A Correlated Abstract

(Section VII in a Series on Forgings, Forging Methods and Forging Equipment)

By GEORGE SACHS
Metallurgical Department
Case School of Applied Science
Cleveland

FORGED products are generally considered to have substantially higher properties than cast ones and also to be more reliable—that is, to possess more consistent properties. This view is undoubtedly correct for the majority of applications; but experience with certain forgings, especially those of heavy sections, has shown that caution must sometimes be exercised in making such claims.

At any point in a casting, the strength is approximately the same in all three directions, whereas the strength properties may be different in the three directions in plastically deformed metal. For practical purposes, two directions are of special interest (see Fig. 1)—namely, the longitudinal direction or direction of fiber and the (principal) transverse direction or direction across the fiber. In a simple forging such as a bar, it is easy to distinguish between the longitudinal and transverse directions; and published investigations on this subject are with few exceptions restricted to forged and rolled billets and bars.

In more complicated forgings (1), special consideration is necessary to determine which direction is longitudinal and which is the principal transverse. For example, even in disks or in the various sections of angles and propellers, Fig. 1, some difficulty is encountered. However, the fundamental conclusions derived from forged bars and disks can also be applied, with caution, to correspondingly deformed sections of more intricate shapes and forgings.

Transverse Properties: Regarding the properties of forged steel billets and bars, it has been generally observed [(2) to (15)] that the yield strength and ultimate tensile strength depend but little upon the size of the ingot, the reduction in cross-sectional area by forging or rolling and the direction of the test specimen in relation to the fiber, Fig. 2. On the other hand, elongation and contraction in area in tensile tests and the energy consumed in notched bar impact tests (impact strength) increase with increasing reduction in the direction of fiber and may decrease simultaneously in the transverse direction.

Practical experience has shown that a certain minimum reduction in forging is necessary to obtain the highest uniformity and optimum properties in heavy steel forgings. Thus, Demmler and Strauss (6) state that "common practice is at least 3 to 1 reduction in cross section from the ingot while 2 to 1 reduction is not uncommon where transverse tests are specified." Correspondingly, die blocks which are subjected to a multidirectional stress state are upset from slightly preforged (cogged) ingots on all six sides in such a manner that their final cross-sectional area is between 20 and 35 per cent of that of the ingot or between 30 and 50 per cent of that of the cogged billet (7).

Maurer and Korschan (8) determined the mechanical properties of bars, forged from 100-ton ingots of various 0.2 to 0.4 per cent carbon steels (carbon steel, manganese steel, nickel steel, and chromium-nickel-molybdenum steel), having an approximate diameter of 80 inches, to various diameters down to 37 inches. The values scatter considerably but show that the ultimate strength and yield strength of annealed, of normalized, and of oil quenched specimens are not materially changed by forging, being approximately the same in the longitudinal and transverse directions throughout the piece.

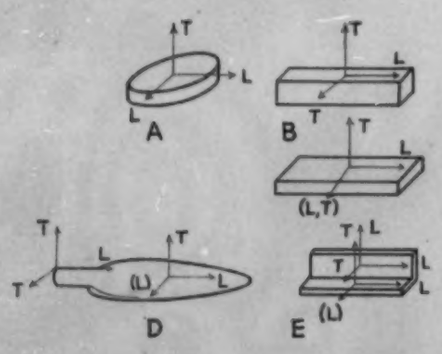
On the other hand (as previously mentioned), those mechanical characteristics which depend upon the ductility of the metal, such as elongation, contraction in area and impact strength, Fig. 6, increase in the longitudinal direction with decreasing section size (increased reduction) but simultaneously decrease in the transverse direction. This resulted in the average ratios between the transverse and longi-

TABLE I—Mechanical Characteristics, Large Ingots

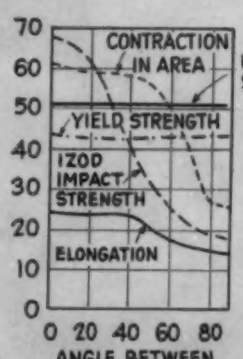
	Ratio of cross-sectional areas before and after forging (reduction):		
	2 to 1 (50%)	3 to 1 (67%)	5 to 1 (80%)
Elongation	0.77	0.71	0.65
Contraction in area	0.67	0.52	0.54
Impact energy	0.70	0.62	0.48

TABLE II—Mechanical Characteristics, Smaller Ingots

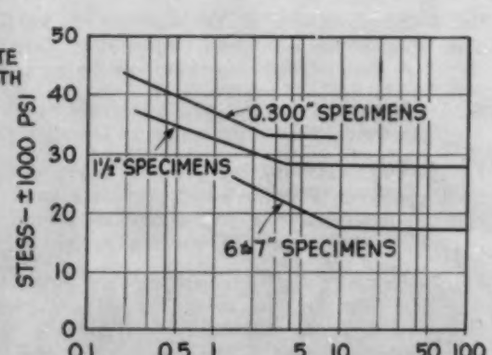
	Ratio of cross-sectional areas before and after forging (reduction):		
	2 to 1 (50%)	3 to 1 (67%)	5 to 1 (80%)
Elongation	0.63	0.77	0.71
Contraction in area	0.60	0.65	0.56
Impact energy	0.72	0.57	0.51



① FORGINGS



② SPECIMEN AND FIBRE



③

tudinal properties of the oil-quenched specimens shown in Table I.

The largest difference between longitudinal and transverse properties, Fig. 6, were encountered in the manganese steel, the smallest in the nickel steel. The heating temperature was 2300 degrees Fahr., and the bars were forged by means of a flat and a V-die.

Similar forging experiments on smaller, 50-ton ingots, approximately 60 inches hexagon, of the same steels by Maurer and Gummert (19) show, however, (Fig. 6), that the average ratios between transverse and longitudinal properties are somewhat improved on forging up to a reduction of 3 to 1. See Table II. Again, the manganese steel was inferior to the other steels.

Korschan and Maurer (10) also compared the properties of oil-quenched square specimens of these steels having a side length of 1.6 inches and rolled to the finished dimensions with specimens cut from the 100-ton ingot forged to 37 inches in diameter. Throughout the latter specimens, mechanical characteristics were more than 90 per cent of those of the small section.

Voss (11) investigated the effects of forging various ingots, having a diameter of 20 inches, on the impact strength of a low-carbon nickel-chromium steel (0.15 per cent carbon, 3.7 nickel, 0.9 chromium) and a medium-carbon chrome-moly steel (0.34 per cent carbon, 1.2 chromium, 0.2 molybdenum). He observed generally an increase in impact strength, Fig. 4, in the longitudinal direction from the values of the ingot to a maximum value which was reached at reductions of approximately 10 to 1 and not changed by further stretching. The transverse impact strength of the two steels, which were unfortunately heat treated in a different manner, behaved differently. The nickel-chromium carburizing steel, heat treated to a strength level of 200,000 pounds per square inch, showed on the average an increase of transverse impact strength from the values of the ingot to a maximum value at reductions above 10 to 1. The transverse impact strength of the chromium-moly structural steel, which was heat treated to a strength level of 120,000 pounds per square inch, on the other hand, decreased steadily from the values of the ingot to a minimum at reductions above 10 to 1. Considerable variations were observed in the properties of billets made from different ingots of the chrome-moly steel; and the ratio between transverse and longitudinal impact strength was, on the average, considerably smaller in the chrome-moly steel than in chrome-nickel steel, Fig. 4.

The differences in the properties of forgings of the same steel made from various ingots have been attributed to corresponding differences in the ingot which could not be correlated with the primary or secondary grain structure of ingot and forgings. However, it was observed that forgings with high transverse impact strength usually had a finer grain than those with a low transverse impact strength, other factors being identical.

Delbart (12) (13) summarizes the results of numerous previous inves-

(*Please turn to Page* 101)

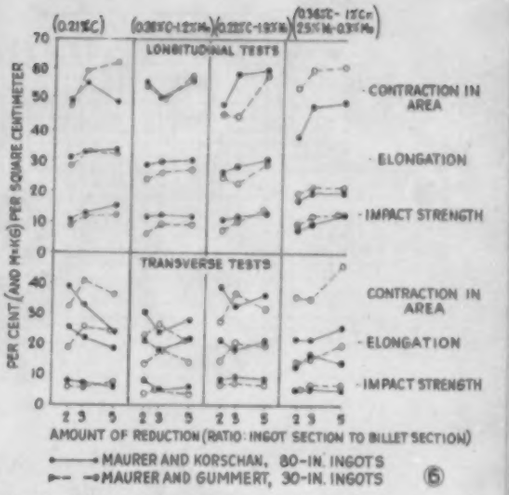


Fig. 6—Effect of forging on various ductility characteristics of some heat-treated alloy steels

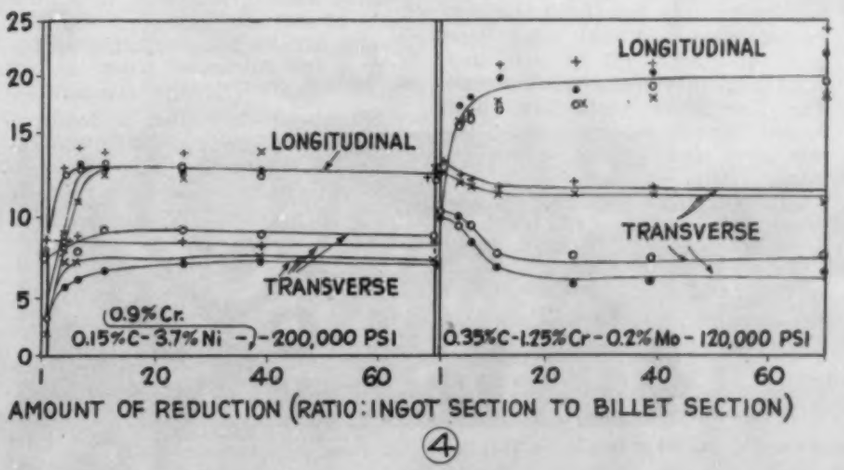
Fig. 1—Longitudinal and transverse directions of grain flow or fibering in forgings of various shapes: A, disk; B, square and round bar; C, rectangular bar; D, propeller; E, rolled angle. Letters "L" and "T" designate longitudinal and transverse directions

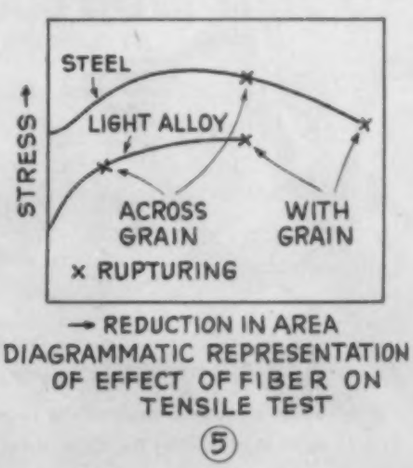
Fig. 2—Effect of direction of testing on the properties of a rolled slab (Brearly)

Fig. 3—Effect of specimen size on the fatigue strength of 0.50-per cent carbon axles (Horger and Neifert)

Fig. 4—Effect of forging on the impact strength of various ingots, 20 inches in diameter, of two alloy steels (Voss)

Fig. 5—Diagrammatic representation of effect of fiber direction on rupturing in tensile tests

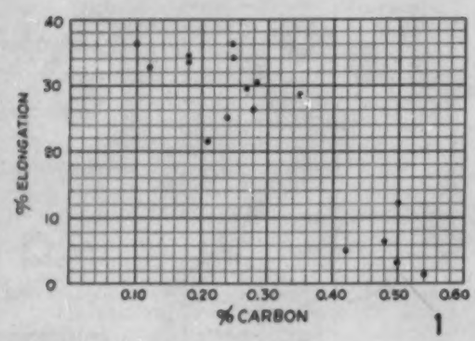




By HAROLD LAWRENCE
Metallurgist and
Welding Engineer

WELDABILITY

. . . . as determined by ductility tests—the various types of ductility tests being described and their results evaluated from the standpoint of their determination of weldability



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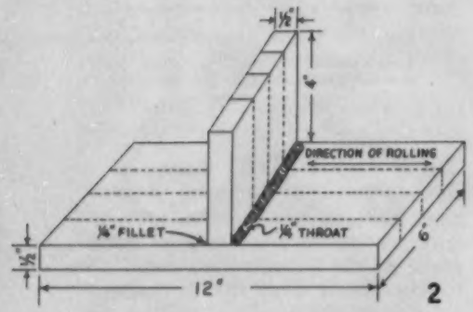

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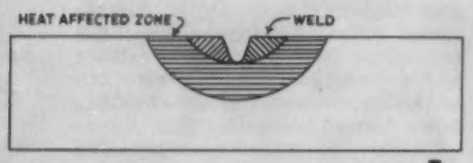

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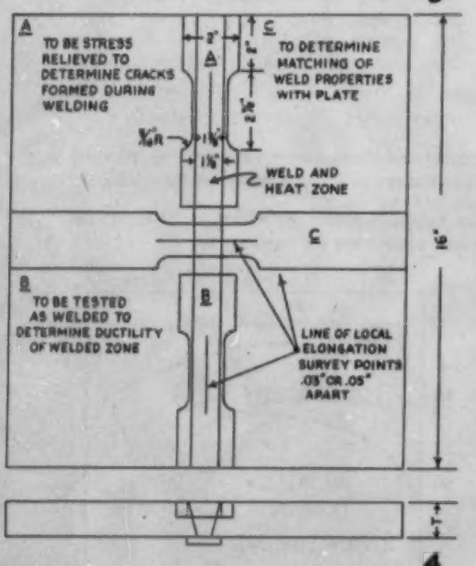

A
TO BE STRESS RELIEVED TO DETERMINE CRACKS FORMED DURING WELDING
TO DETERMINE MATCHING OF WELD PROPERTIES WITH PLATE
WELD AND HEAT ZONE
B
TO BE TESTED AS WELDED TO DETERMINE DUCTILITY OF WELDED ZONE
LINE OF LOCAL ELONGATION SURVEY POINTS .05" OR .05" APART
4

Fig. 1—Influence of carbon content on per cent elongation in bead-bend test after data of Jackson and Luther

Fig. 2—T-bend test as described by Bissell

Fig. 3—Charpy impact specimen for impact or V-notch slow-bend tests

Fig. 4—Method of cutting the three specimens used in the Hess tensile-ductility test

RECENTLY a definite trend in acceptance of ductility measurements as a prime test for weldability has been observed. Hardness tests, simple and accurate as they are, have been relegated to a subordinate role as an index to the expected ductility of the heat-affected zone of the parent metal when the relationship between hardness and ductility in the auto-quenched portion of the parent steel is on record. Therefore the need exists for reviewing the many types of recommended ductility tests that have been developed as indices to weldability.

Ductility tests are empirical tests. They are not used to discover what metallurgical changes have been brought about by the heat cycle of welding. Rather these tests are used to measure the degree of bending or elongation without any attempt to classify the microstructure. Either the specimen exhibits satisfactory ductility and freedom from cracking or it doesn't. That is all. But the correlation of ductility and hardness values under specific welding conditions may furnish additional information extraneous to the test although useful in establishing general relationships between these two qualities.

There are six definite tests that may be employed to evaluate ductility and which have been widely discussed by qualified welding engineers. These are, without any regard for the order of their relative importance, (1) free bend test, (2) guided bend test, (3) bead bend test, (4) T-bend, (5) V-notch, slow bend and (6) tensile-ductility test. The first three tests have been known for some time, while the last three tests are of more recent origin.

Before discussing these tests, the reason for checking the property of weldability must be understood. Why has the matter of weldability become both important and popular recently? Mainly because of the trend toward the welding of high-tensile steels and high-carbon alloy steels of extreme hardnesses. The former steels will be found in ordnance as supporting structures for mobile guns, while the latter steels find a natural use as armor plate. Both classes of steels must be welded to combine the desirable qualities of lightness for greater maneuverability with the necessary strength and rigidity.

Free-Bend Test: Without question, the oldest test for the determination of the ductility of a welded joint is the free-bend test. Here a specimen is cut transverse to the welded joint and the bending takes place across the weld, involving both the weld metal and the heat-affected parent steel. To facilitate bending, the specimen is crimped at its third points and then bent in compression as a free strut. Since this test is well known because of its long time inclusion in all welding qualification tests, it is not illustrated.

Fortunately the free-bend test demonstrated a striking ductility of deposited weld metal before the limitations of the test were clearly defined. In the days when all weld metal was subjected to an intense inspection, the free-bend test demonstrations of soundness of weld and commendable ductility were helpful to the rapid acceptance of fusion welding processes. A definite size of specimen prevailed with the width usually being specified as 1½ times the thickness. Even so, results were not always comparable.

Free-bend elongation is reported as the per cent increase in elongation of a known increment established prior to bending by scribing

(*Please turn to Page* 109)

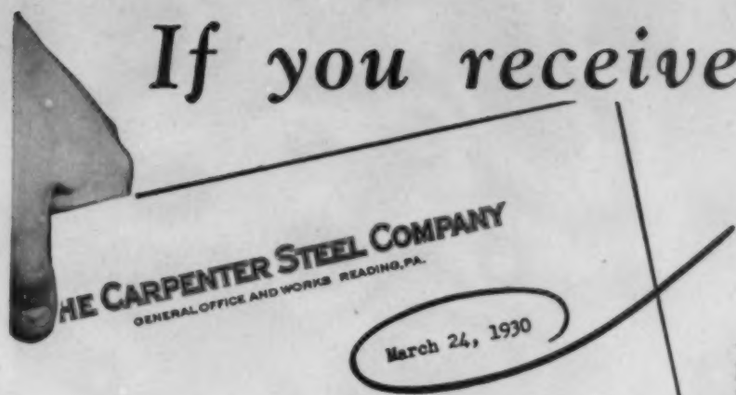
References

"T-Bend Test as a Means of Determining the Weldability of Steel" by A. G. Bissell, *The Welding Journal*, Research Supplement, April, 1940.

"A Comparison of Tests for Weldability of Twenty Low-Carbon Steels" by C. E. Jackson and G. G. Luther, *ibid.*, October, 1940.

"Evaluating Welded Joints" by Wendell F. Hess, *ibid.*, October, 1941.

If you received this letter



THE CARPENTER STEEL COMPANY
GENERAL OFFICE AND WORKS READING, PA.

March 24, 1930

Gentlemen:

May we have your cooperation?

We have prepared some very interesting and informative bulletins on the use of tool steels, and we would like to direct these bulletins to the attention of the men in your plant who buy and use such tools.

They will find the bulletins helpful not only as a guide for economical purchase but in the design, heat treatment and use of their tools.

...rite on the enclosed card the names ...men in your organization ...ation as an aid ...ished

in March, 1930 . . .

. . . you were among the first to hear of Carpenter's program of *All Aid to Tool Steel Users.* Today, many years of experience enable us to provide a vital wartime service—helping to boost production and conserve precious tool steel.

Literally thousands of tool room supervisors and tool engineers have used this program. Reports from many plants show that Carpenter cooperation and assistance have been doing a lot to help . . .

step up machine output
conserve valuable metals
avoid hardening troubles
get longer tool life
train new men on the job
cut tool and production costs

If you can use help to accomplish those things—here is a program backed by years of research and experience in tool rooms and production plants.

As an immediate starter, we offer "Tool Steel Simplified". This handbook is being used in tool rooms, heat treating departments and machine shops to make every pound of tool steel contribute its share to *faster production.* It can help train apprentices faster. It can act as an excellent "refresher course" for the tool maker, while providing a useful reference source for tool engineers.

This handbook can help you overcome tool room problems *now,* and if at any time you are faced with a new problem, remember that the services of your nearby Carpenter representative and our Metallurgical Department are at your disposal.

Over 25,000 copies of "Tool Steel Simplified" are helping to produce *better tools* that will do the jobs *more quickly.* It answers common questions on *eliminating tool warping, avoiding grinding checks* and *making tools wear longer.* Three chapters on heat treating procedure, and others on such subjects as "Trouble Shooting" and "The Relation of Design to Heat Treatment", make this 315-page handbook *must* reading for every man responsible for tools. "Tool Steel Simplified" is offered at cost—$1.00—to tool steel users in the U. S. A. ($3.50 elsewhere). After you have read it, you will want more men in your plant to have copies.

THE CARPENTER STEEL CO.
READING, PA. DEPT. 51

Carpenter MATCHED TOOL STEELS

IMPORTANT BEFORE VITAL NOW

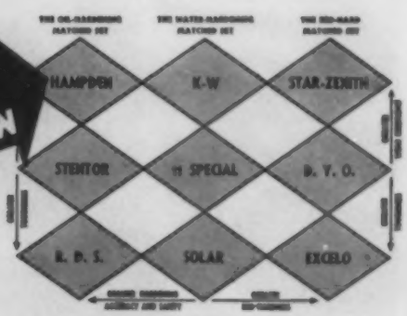


Fig. 1. (Left, above)—Operator checking plating thickness with a micrometer. Timing devices on back panel are part of precision controls necessary for controlling accurately the plate thickness

Fig. 2. (Right)—Parts are carefully racked prior to cleaning and plating. Racks are of metal but are well insulated with a nonconducting coating to prevent their being plated and to allow more accurate control of the plating operation

PRECISION PLATING of radio condensers

. . . . is required since thickness of plated deposit directly affects performance of the product which itself is part of a precision communication instrument

By E. C. RINKER
Mechanical Research Laboratory
Oakite Products Inc.
New York

THE HIGHLY mobile motorized warfare of today would not be feasible without the development and improvement of radio communication. Since radio plays such an important role, it is essential that the radio equipment be the most serviceable and modern that science can provide.

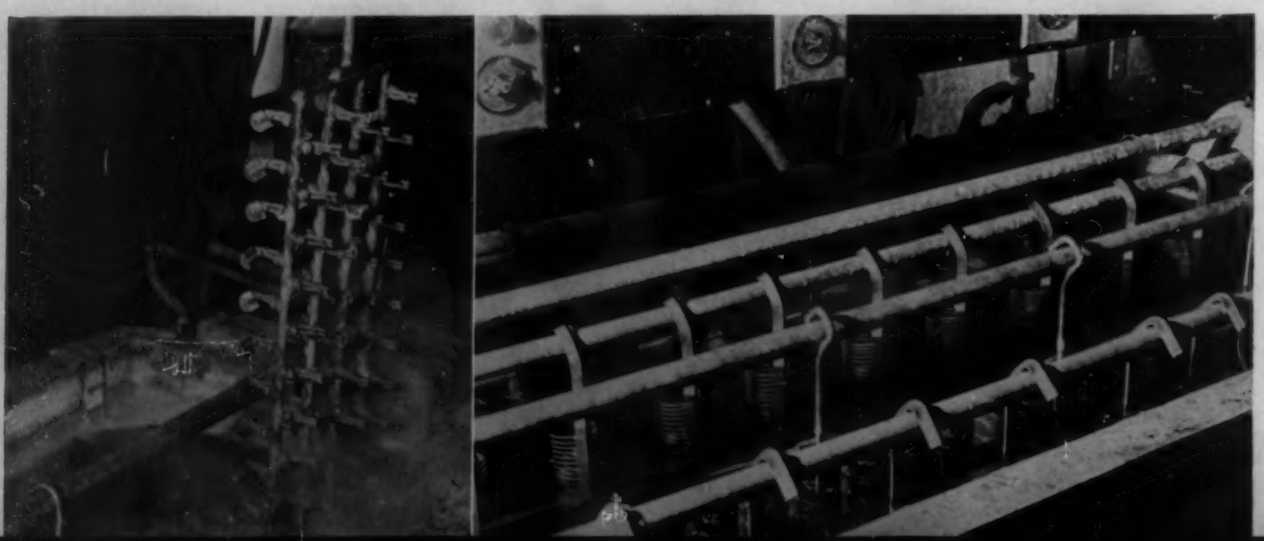
Among the various parts to be electroplated, the moving plate-type variable condenser presents many unique problems to the electroplater. The basis metals used are largely aluminum, brass and Invar metal. These are electroplated to close specifications. The exact thickness specified must be adhered to because any variation automatically changes the air gap and upsets the electrical capacity of the condenser. The need for precise standards can be understood readily when it is realized that in some of the small condensers the air gap is as little as 0.015-inch. The thickness of the electrodeposit specified is determined according to its corrosion resistance.

Condensers made of aluminum (17ST), which is used because of its high electrical conductivity and low specific gravity, are given the following treatment. The aluminum disks are plated by depositing 0.0005-inch of nickel, are then given a 0.0002-inch deposit of copper to facilitate soldering to the rotor sleeve. A patented treatment is given the aluminum before electroplating to

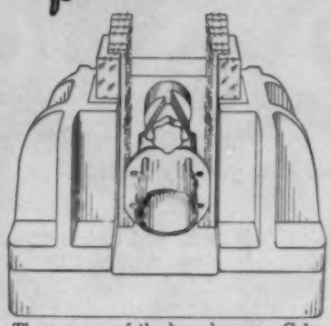
(*Please turn to Page* 113)

Fig. 3. (Left, below)—Racked parts are first cleaned in this tank of boiling Oakite solution. After rinsing and a quick dip in the acid tank, parts are ready for the plating bath

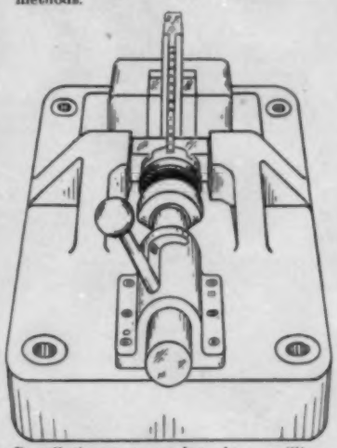
Fig. 4. (Right)—Copper plating tank with timing devices. Periodic filtering keeps solutions free of foreign substances. Note the clarity of the electrolyte



at Continental Motors for example...



Three passes of the broaches on a Colonial Senior press, and the flats on the cylinder flange of a radial engine are finished. The cam above the cylinder in the fixture controls the infeed for each pass. Precision and output both better than by other methods.



Castellating nuts used to be a milling job. Here is a broaching setup that answered the demand for greater accuracy in special nuts. The output also turned out to be much greater than if the nuts were milled individually. It's another three-pass job to complete, and a Colonial Senior press is used.

R & F slotting of counterweights on a single Colonial Universal Horizontal in five operations with four broaches. A typical job-lot production setup. The two counterweights give an idea of the metal removal required.

AMONG OTHER COLONIAL JOBS AT CONTINENTAL:

Broaching fuel pump drive gear. Broaching splines in generator gear, oil pump drive gear, scavenger pump gear, oil strainer nipple, generator drive gear support, etc. Broaching keyway in tachometer drive shaft gear. Burnishing such parts as vacuum pump adapter bushing, etc., etc.

In Broaching you get both...

Some machines are bought for the accuracy to which they can machine, some for rapidity of metal removal. The reason there is such a demand for broaching machines and broaches today is that in broaching you get BOTH.

For job lots as well as mass production —in a multitude of operations—broaching has definitely established itself as the fastest and most economical method of removing just the right amount of stock in just the right places. One Colonial standard broaching machine, for instance, will frequently equal the daily output of several machines of another type to do the same job, even though broaching may have been adopted to meet more stringent accuracy requirements.

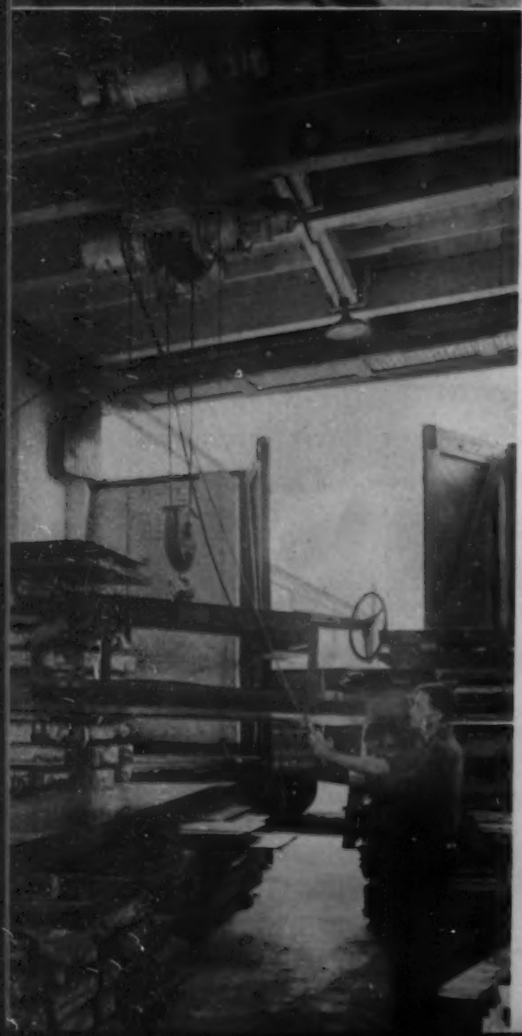
May we suggest that you start today to look over your present and projected production setup to determine how many machines you can eliminate from your requirements by broaching?

Scheduling your future broaching machine requirements now will help to insure getting them when you need them. There is a Colonial representative in your territory who will be glad to help you.

We will be glad also to put you on the mailing list to receive "Broaching News" monthly. In it you will find varied examples of how broaching may be used to lower costs, increase production, and improve accuracy. A note on your company letterhead suffices.

COLONIAL BROACH CO.

147 JOS. CAMPAU • DETROIT, U. S. A.



HANDLING TIME CUT 96 PER CENT

Unloading and storing of sheet steel by means of crane and grab instead of by hand reduces handling time and costs. Losses from damaged and scratched material are greatly reduced

MECHANIZATION of the system for receiving and storing of sheet steel at the plant of A. S. Campbell Co., East Boston, Mass., manufacturer of pressed steel parts for the auto motive industry, has greatly reduced the time and cost of handling shipments. Three carloads of steel, amounting to 90 to 100 tons, are received weekly at this plant.

Formerly steel arrived in box cars from which it was unloaded one sheet at a time by four men—two being inside the car and two outside to receive the long sheets and pile them properly on the floor trucks. Two other men were also required in the steel storage room to unload the floor trucks and pile the sheets. Due to the size of the sheets, this was a slow process, often as much as a whole day being required to unload one car.

It was decided to modernize this receiving system, and a small building in which to store and cut the steel was erected adjacent to the main plant. A 2-motor floor-operated Shepard Niles crane system of 3-ton capacity, complete with runways and bridge, was installed. It is equipped with a Mansaver grab manufactured by J-B Engineering Sales Co., New Haven, Conn. This new setup permits use of open freight cars and enables one man to unload a car and place the steel in storage, thus releasing the other five men for productive work. Since only 2 hours is required for unloading and storage if unwrapping of the packages is not necessary, a saving of 46 man-hours, or 9 per cent over previous hand method is achieved.

Fig. 1. (Upper view)—This crane and grab permit unwrapping, unloading and sorting of sheet steel from car to plant by one man in a total time of 3 hours —a 94-per cent saving in time over former hand methods

Fig. 2. (Lower view)—Sheets, either wrapped or unwrapped, are stored to a height of 8 to 10 feet by means of this equipment instead of 4 to 5 feet when stacked by hand, thus doubling storage capacity and facilitating inventory

If steel is unwrapped before storing, about 3 hours are required to unload a car and store the steel, a time saving of about 94 per cent.

As shown in Fig. 2, the runways supporting the crane bridge are I-beams which extend permanently over the railroaod siding. This is made possible by an ingenious system of doors permitting the whole wall to be closed up solidly with the runways extending through it when the crane is not in use. Above the vertical doors which permit passage of grab and load into the building is a narrow horizontal door extending from runway to runway. It swings inward and is fastened up against the ceiling when open.

This opening is extended by a small vertically hinged door the same height as the long horizontal door, and also swinging inward, beyond the runways either side, allowing crane bridge to move along runways to position over siding. This obviates the necessity for hinging the runways to swing them inside the building when the main doors are closed and for supporting the hinged sections when they are in use over the tracks.

A pendent pushbutton station, held by operator in both illustrations, controls the hoist motor. Hoist is traversed on the bridge by hand. Bridge itself is powered by a separate motor which moves it up and down the runway. Hanging control handles are visible in front of the grab in Fig. 2. All controls can be operated from the building floor level or that of railroaod car or truck with equal ease as seen in Figs. 1 and 2.

As siding is paved, trucks as well as freight cars can be unloaded by this installation. To unload a freight car or truck placed under the runways, crane bridge is positioned over the load. Grab, fabricated of standard steel shapes, is lowered over the sheets to be removed. Arms of grab are brought together by means of the wheel control so that edges of the angle irons at base extend under the sheets, supporting them firmly. See Fig. 1. Then grab is raised by the electric hoist and entire bridge

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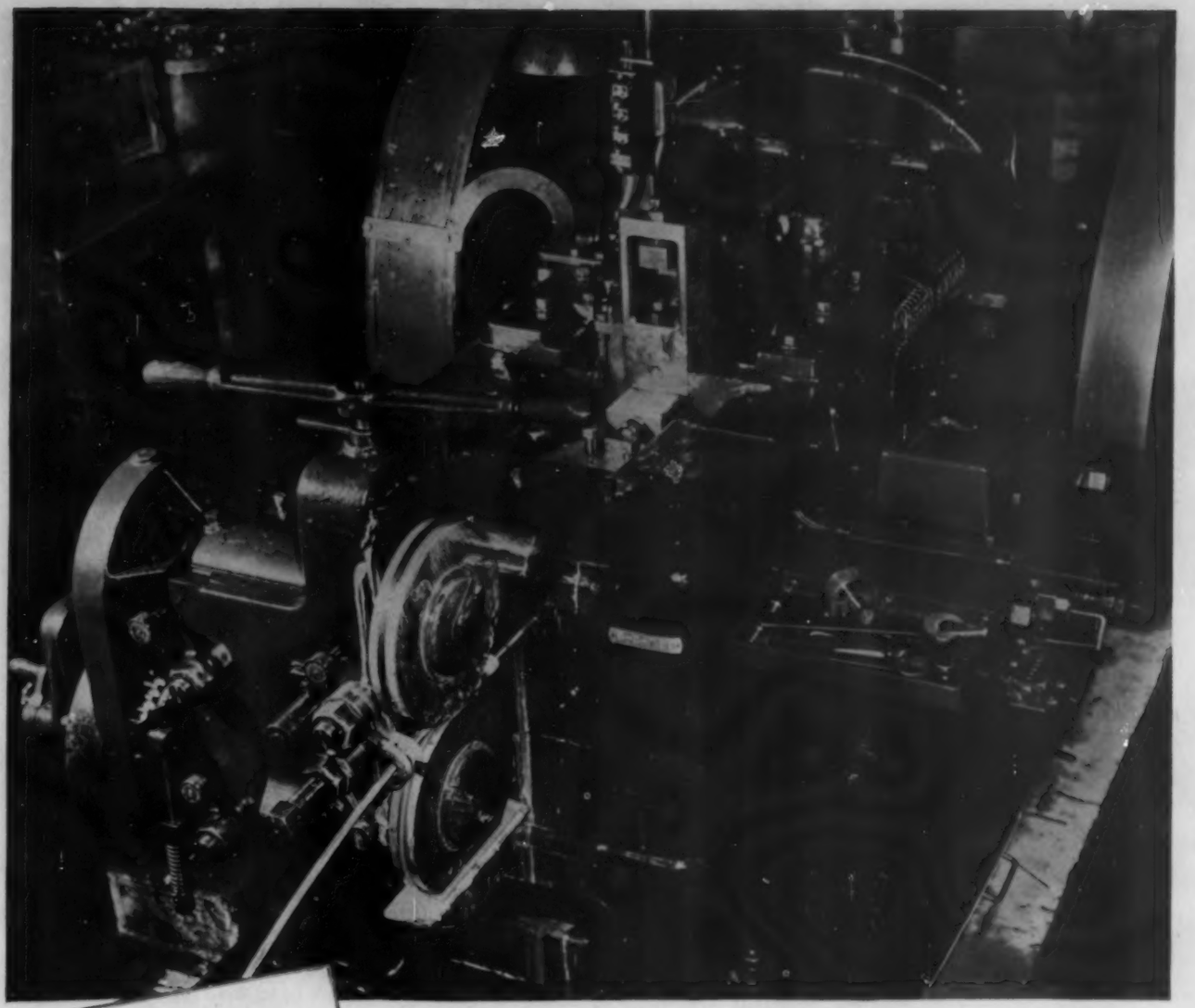


The illustration shows a typical header on which R B & W bolts are "upset" — the best method for insuring strength. Bolts headed by this method require the use of better and more uniform raw material — thus a double reason for stronger heads. Photomicrographs show perfect continuous flow lines and grain structure.

They'll keep their heads when the guns go off!

FIRE A 155MM HOWITZER and feel the ground jump under your feet. Let go a 16-inch shell from a battleship turret and feel the recoil shake your spine. Then decide: do bolts and nuts have a job holding a gun platform together?

You could tell from the orders arriving this morning at our great one-purpose nut plant at Coraopolis, our bolt factory at Rock Falls, our main plant at Port Chester . . . how highly the shipyards and arsenals respect the *holding* power of R B & W bolts and nuts.

Behind-the-line fighters, too, in increasing numbers, are R B & W fastened . . . plows and harvesters that roam the earth for food, and mining tools that dig it for metal . . . trucks and railway rolling stock that rush the goods cross-country . . . machinery and power plants and airplane hangars that help us "put on the heat" to win the war.

Through generations of war-time and peace-time, the conviction has grown: for all hang-on-and-take-it jobs, write "R B & W Empire" on your orders.

Russell, Burdsall & Ward Bolt and Nut Company. Factories at Port Chester, N. Y., Rock Falls, Ill., Coraopolis, Pa.; sales offices at Philadelphia, Chicago, Detroit, Chattanooga, Los Angeles, San Francisco, Portland, Seattle.

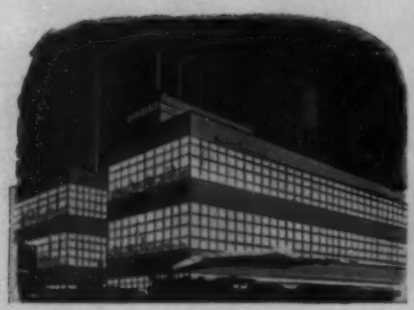
RB&W

Making strong the things that make America strong

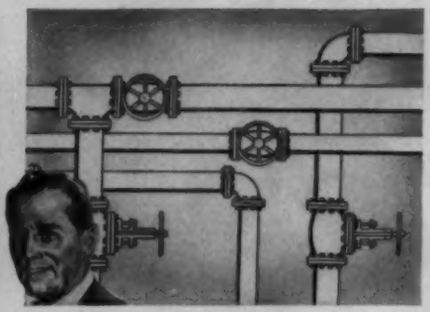
EMPIRE

AND ALLIED FASTENING PRODUCTS . . . SINCE 1845

These "Pointers" Made a Tough Training Job Easier!



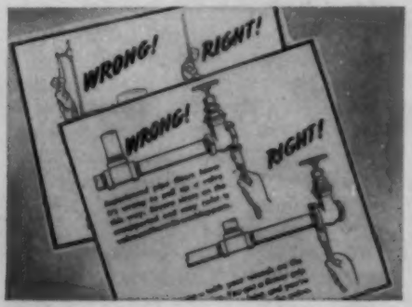
1 With the plant running 168 hours a week, we needed more and better maintenance—day and night. On piping, for example, you can't get away with part-time maintenance and keep production lines running smoothly. It's too important!



2 Soon enough, we found valves and fittings would have to be handled with unusual care to get every last bit of service out of them. They're vital equipment, and with all the demands of war, deliveries of replacements were being slowed up.

3 Sure, we put on more "maintenance" men, but many had never handled a wrench before. We had to start from scratch in training them. In the past, our veteran crews had the time to teach apprentices, but that was "before Pearl Harbor."

4 You know that piping maintenance is a specialized job. But it's knowing the "kinks" of the trade that makes the difference between good and bad installations. They help speed-up the work as well as step-up efficiency of pipe lines.



5 We had to teach these men the "rights and wrongs" of piping make-up. We had to be sure they knew enough about valves of all types, and when and where to use them. Good piping depends a lot on using the right equipment.

6 These Crane Shop Bulletins made a tough training job easier. They're full of valuable piping pointers. We used them in employee training classes; posted them in maintenance shops; passed them among the men. Even the old-timers use them! **And listen, any plant can get these Bulletins free—through the local Crane Representative.**

CRANE

CRANE CO., GENERAL OFFICES:
836 SOUTH MICHIGAN AVENUE, CHICAGO

VALVES • FITTINGS • PIPE
PLUMBING • HEATING • PUMPS

NATION-WIDE SERVICE THROUGH BRANCHES AND WHOLESALERS IN ALL MARKETS

By R. J. WEAN
President, Wean Engineering Co.
Warren, O.

Developments in STRIP STEEL FINISHING LINES

Output of flat rolled material of various specifications is stepped-up by multiple-purpose lines at finishing end. Combination unit is designed to slit both heavy and light-gage strip. Trend is toward use of hydraulic operation of auxiliary movements for reels and uncoilers

ONE OF the most interesting developments in recent months with respect to processing and finishing equipment has been the installation of several "multiple purpose" lines designed to perform any, or possibly all, of two or more different operations, or to handle material of widely varying specifications.

One example is a combination slitting and shearing line consisting of a coil holder, slitter, reel, flying shear, belt conveyor and piler, arranged to receive material in coils and either slit it into multiple widths and recoil, or shear it into cut lengths and pile. In the latter case the material may be side-trimmed before shearing, the slitter used being a conventional side trimmer with removable slitting arbors.

A large number of slitting lines for slitting wide strip into multiple widths have been installed during the past year. In this connection, production requirements have often made it desirable to slit both light and heavy gage strip on the same line, a difficult problem since light gages are best slit by relatively small diameter knives, while for heavy gages larger arbors and, therefore, large diameter knives are required. This problem has been solved by the use of combination slitting unit.

The unit has a main base on which the drive with universal spindle connection to the arbors is permanently mounted. This base is designed to receive either of two slitting assemblies, each consisting of portable base, housings, arbors and knives. For example, one in-

Left above, side trimming and shearing line with hydraulic operated cone-type coil holder, side trimmer, guillotine-type flying shear with leveling stand, belt conveyor and piler. Unit is designed for shearing material 48 inches maximum width, 1/8-inch maximum thickness, to lengths from 30 inches to 20 feet at speeds from 100 to 300 feet per minute

Left below, back-up roller leveler for armor plate equipped with leveling rolls 9 inches diameter and 72-inch face

Right below, shop view of tension reel with toggle collapsing head. The reel is built to handle coils 74 inches maximum width, 24 inches inside diameter, 15,000 pounds maximum weight, at speeds of 150 to 600 feet per minute

PORCELAIN ENAMEL ROOFING AND SIDING fabricated from U·S·S VITRENAMEL Sheets—new type of roofing you can install and forget. No painting or maintenance is required.

FOR IMMEDIATE PAINTING — U·S·S Paintbond. This Bonderized galvanized sheet gives paint a firm bond, as is shown by this scratch test. Paint chips off the section that is not Bonderized, holds tight to the Paintbond. U·S·S Dul-Kote, available in the South and West, has similar advantages.

STEEL BUILDINGS go up in a few days instead of weeks and months when the design is right. Standard units permit blackout or window construction. Buildings can be moved without loss or damage.

U·S·S PANELBILT CONSTRUCTION offers countless variations in sizes and arrangements of industrial or war buildings. All can be quickly erected from factory-built panels and sections of steel. Also quickly demountable with complete salvage value. Available in the South from Tennessee Coal, Iron & Railroad Company.

USS

Steel construction is shatterproof

Goes up at record breaking speed

STEEL doesn't shatter . . . and that's an important reason why it is being used for so-called bomb-resisting construction. We say "bomb-resisting" with reservations, because no structures are proof against direct hits . . . not even battleships.

Near misses are different. They cause extensive damage to ordinary construction because masonry shatters, breaks up into flying missiles which are almost as dangerous as bomb fragments.

Steel construction can be easily designed so that the shocks of near misses will not cause too much damage. If a few panels are blown out, they can be replaced. The main structure stands a better chance of remaining intact.

What steels to use

For exterior walls and roofing, U·S·S Copper Steel gives 2 to 3 times the life of plain steel . . . and the cost is very little more. When you use uncoated steel this extra corrosion resistance is extremely important.

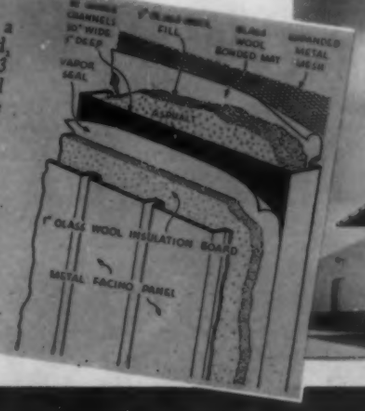
For exteriors requiring quick painting, use U·S·S Paintbond. Paintbond is galvanized and Bonderized. It holds paint tighter, keeps corrosion from getting a foothold. Paint doesn't chip or flake off. U·S·S Dul-Kote, available in the South and West, has similar advantages.

For interior wall paneling U·S·S plain, uncoated sheets are widely used. They can be formed easily into any desired shape.

For more permanent roofing and siding, U·S·S VITRENAMEL is rapidly gaining favor. It is coated with porcelain enamel which assures a structure requiring extremely little maintenance and no painting.

WALL CONSTRUCTION consists of a formed steel facing, insulation board, vapor seal, a 22 gage steel channel, 3 inches of insulation, a bonded mat and expanded metal lath. Steel parts are made by fabricators of U·S·S Steels.

NEW BLACKOUT BOMB-RESISTING CONSTRUCTION adaptable to industrial buildings, airplane hangars, factories, etc. Steel wall paneling was erected at the rate of 333 sq. ft. an hour—roof at an acre a day. Finish is baked enamel.

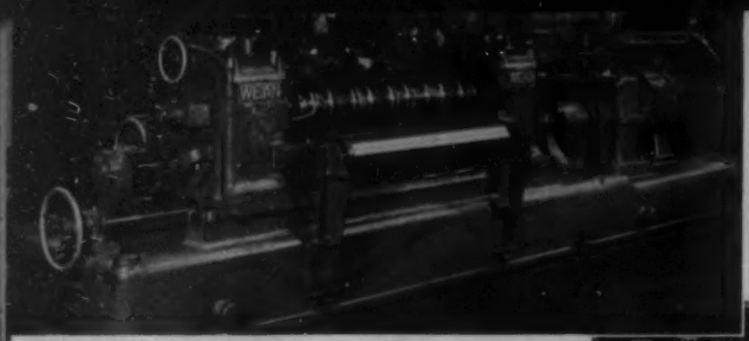


U·S·S STEEL SHEETS

CARNEGIE-ILLINOIS STEEL CORPORATION, *Pittsburgh and Chicago*
COLUMBIA STEEL COMPANY, *San Francisco*
TENNESSEE COAL, IRON & RAILROAD COMPANY, *Birmingham*

Scully Steel Products Company, Chicago, *Warehouse Distributors* · United States Steel Export Company, New York

UNITED STATES STEEL



Immediately above, combination side trimmer and slitter with removable slitting arbors. Unit is designed for making up to 10 cuts in material 48 inches maximum width, 16 gage and lighter at speeds up to 600 feet per minute

Immediately below, side trimming and tight coil line with hydraulic operated cone-type coil holder, double pinch roll tension drag unit, side trimmer and scrap cropper, and tension reel with outboard bearing. Complete unit handles material 74 inches maximum width, 14 gage and lighter, at speeds from 150 to 600 feet per minute

stallation has an assembly with 10-inch diameter knives for slitting light gage strip, and another assembly with larger diameter arbors and 15-inch knives for slitting heavier material. While one slitting assembly is in use, the knives on the other slitting assembly can be packed for the next order.

Careful application of motors and control has been required in connection with all of the multiple purpose lines and equipment such as those just described, and the use of Ward-Leonard or variable-voltage control in connection with constant potential or field control of various motors has been general practice.

Two plants have installed strip cleaning and tight coiling lines for cleaning light gage strip before annealing. The cleaning units consist of alkali spray and scrubber unit, incorporating large capacity pressure sprays and separately driven high-speed brushes above and below the strip, followed by a similar water spray and scrubber unit. A special feature of one of these lines is that the ends of the coils are not joined together, eliminating the use of a welder or stitcher at the entry end and the use of a shear at the exit end. The line, which operates at a speed of 800 feet per minute, consists of a cone-type coil holder, alkali spray and scrubber unit, water spray and scrubber unit, dryer, pinch rolls, tension bridle and recoiler. The leading end of each coil is fed through the cleaner unit by a series of motor-driven pinch rolls, which are disconnected by magnetic clutches after the material reaches the main pinch rolls.

The demand for larger coils having smaller inside diameters has resulted in considerable development work with respect both to tension reels and expanding mandrel type uncoilers. In both cases, mechanically and hydraulically operated types now are available for handling 16-inch diameter coils weighing 15,000 pounds or more and 20-inch diameter coils up to 30,000 pounds. A distinct trend toward the use of hydraulic operation for the various auxiliary movements of machines of this type is evident.

Considerable development work has gone forward with respect to continuous strip electrolytic tinning and galvanizing. Due to the shortages of tin and zinc, these electrolytic coating lines, applying thinner and more uniform coatings, are likely to be installed on a large scale in the near future. Much activity is being put forward in an effort to develop other types of substitute coatings.

"Temper Tower" continuous strip annealing for tin plate was also introduced during the past year.

Many of the year's developments are the direct result of the national defense program, and one interesting example of this is a heavy-duty backed-up roller leveler for armor plate up to 1-inch thickness.

ELECTROLYTIC IRON POWDER

. . . . is developed at Ford Motor Co.

RESEARCH into both the production and utilization of iron powder has been carried forward quietly by Ford Motor Co. technicians at the Dearborn, Mich., engineering laboratories of the company throughout the past decade. At one time, a pilot plant was erected for direct reduction of iron ore to a powder or sponge iron, but in later years this was dismantled. More recently the project was placed in the hands of R. A. Boyer, research chemist, who works closely with Mr. Ford, and he succeeded in bringing the development to the point where iron powder was accepted for use in oil pump gears for Ford cars and was proved practical for use in brake cylinder pistons.

The sudden all-out war effort to which the entire automotive industry is now committeed naturally has suspended for the time being the application of iron powder parts in automobiles, but its possibilities are being explored for certain armament items, and development is proceeding at Ford on a pilot plant for establishing the present ore reduction process on a somewhat larger scale than that practiced hitherto.

(*Please turn to Page* 112)

Advertisement APRIL, 1942

COPPER ALLOY BULLETIN

REPORTING NEWS AND TECHNICAL DEVELOPMENTS OF COPPER AND COPPER-BASE ALLOYS

Prepared Each Month by the Bridgeport Brass Co. "Bridgeport" *Headquarters for BRASS, BRONZE and COPPER*

Bridgeport Control Assures Excellent Spring Qualities

Exacting laboratory control at each step of production coupled with the most modern rolling mill equipment make it possible for Bridgeport Brass to make copper-tin alloys with exceptional spring properties. Each melt, for example, is consistently tested and such innovations in production are used as large bar methods of casting, annealing in the most modern type furnaces, and rolling on 4-high tandem rolls.

Copper-tin alloys of high resiliency offer many advantages to fabricators, particularly for electrical spring and contact units. Such alloys can "take" repeated flexing and spring right back for more. They resist fatigue-failure, corrosion, and season-cracking, and permit smooth, economical production.

Typical of these alloys is Bridgeport New Phosphor Bronze, pictured below in the form of a spring contact for a float switch. Its unusual spring qualities have made it popular for many applications. Because of war demands, however, fabricators interested in such an alloy are advised to investigate Duronze* II—a copper-silicon alloy with good spring properties.

1941 Index Available

The 1941 index to the COPPER ALLOY BULLETIN, containing references to all subjects covered during the past year, including items in the New Developments column, is now ready for distribution. A comprehensive plan of cross-reference facilitates use of the index. Copies will be sent free on request on your company letterhead. Simply address Bridgeport Brass Company, Bridgeport, Conn.

Shell Percussion Primers Can Be Manufactured With Light Equipment

Enables Smaller Fabricators to Change to War Production Because Only Small and Medium Equipment is Required

The manufacture of percussion primers for cartridge shells is a war production job that can be handled readily by many fabricators. The rod, sheet and tubing made by Bridgeport Brass to Government specifications for this purpose require only small and medium-sized presses and automatic screw machines, such as those found in most factories equipped for making small screw machine parts, stampings, ornamental jewelry, novelties and vanities.

A percussion primer is a device for igniting the propelling charge of a cartridge shell and is inserted in the base of the cartridge case. Percussion primers are made in different sizes and constructed according to their application.

Parts of a Primer

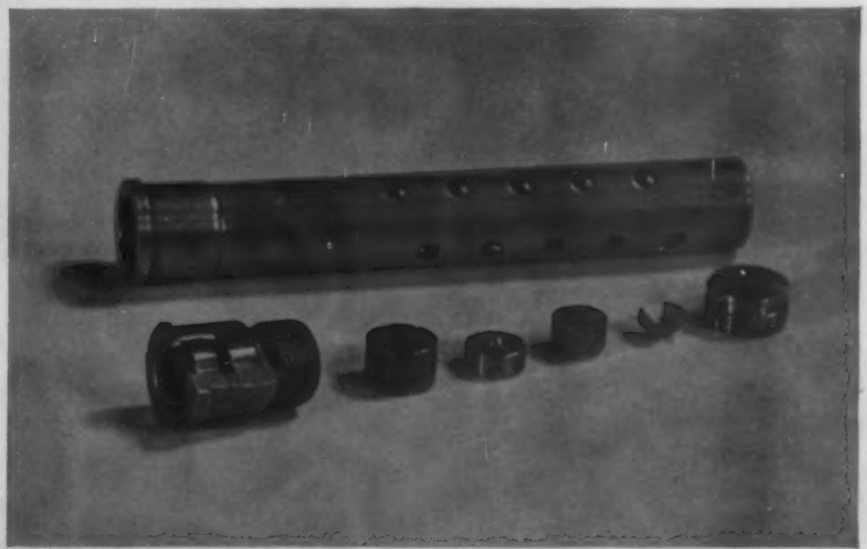
The metal parts of a primer are comparatively small. A typical primer consists of a head and body. The head, which is screwed into the body, is made from brass rod usually turned on a screw machine and hollowed out at each end to form two chambers which are connected by a small round hole. The upper section of the head is threaded on the outside. The larger chamber of the head, or pocket, is filled with the percussion assembly-cup with bottom removed, firing plug, smaller cup, pellet of primer compound, and anvil.

The primer body is made from a brass tube approximately ⅛" O. D. and ranging from about 3½" to 12" long, depending upon the size of the case and the power of the charge. Numerous radial holes are drilled or punched into the tube, the inside ends of which are threaded—one end for the head, the other for a plug which is screwed in and firmly retained by rolling-over the tube end.

Can Pool Equipment

A number of small manufacturers—one having small presses, another several screw machines, rivet machinery, etc.—often pool their equipment and take on defense jobs which none of them alone can handle. Others take subcontract work which larger manufacturers purchase outside, or they themselves farm out some parts to others who have the equipment. Manufacturers contemplating the change-over to ammunition components are cautioned about the much closer tolerances, uniformity and high quality standards which are necessary in such applications.

Bridgeport's metallurgical staff is available for helping customers to change over their plants to war production.



Parts of a primer assembly are shown here. Perforated tube is the primer body. In the foreground, left to right, are: primer head, cup with bottom removed, firing plug, pellet cup, anvil, and sealing plug.

COPPER ALLOY BULLETIN

ALLOYS OF COPPER

This is the thirty-second of a series of articles on the properties and uses of the copper alloys.

COPPER-ALUMINUM ALLOYS

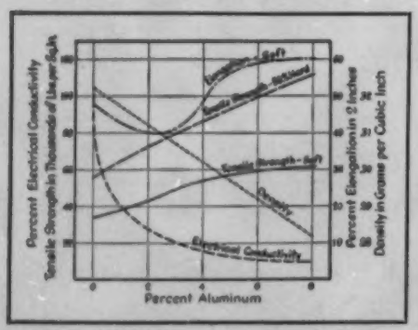
Some of the oldest of the copper alloys are those in which aluminum is the principal added element. Despite this fact, the alloys with aluminum have not been very generally used, because of the difficulties involved in casting and processing. However, these alloys have certain very desirable properties which cannot be duplicated in other alloys.

Copper will dissolve up to about 9% aluminum without forming a secondary constituent. In the range, the alloys which have been made commercially are those containing about 5% aluminum and 8% aluminum. The effect of aluminum on copper is shown in the accompanying curves. It can be seen that the strength of copper is increased fairly rapidly by the addition of aluminum; in fact, this increase is about equal to that due to similar additions of tin. The electrical conductivity is reduced somewhat more rapidly in the aluminum alloys than in the tin alloys. In spite of these good physical properties, the binary copper-aluminum alloys have been used only to a limited extent, and then largely for their corrosion resistance characteristics.

Higher Aluminum Contents

As the aluminum content is increased above 9%, alloys of more than one constituent are produced, and the tensile strength increases very sharply. Alloys of this type have been made in the form of castings, and have been used fairly generally for wear-resistant material. The casting alloys have been modified by additions of other elements, such as iron, nickel, or manganese. More recently, certain of these higher aluminum alloys from 7 to 10% slightly modified with iron, silicon, or nickel have been made

(Continued in column 2)



Effect of aluminum content on properties of copper-aluminum alloys.

Matte Finish Solution

To produce a matte finish on copper or its alloys, the following solution can be used:

Sulfuric Acid	1 gal.
Nitric Acid	1 gal.
Zinc Oxide	2 lbs.

Use hot and keep free of water. If the finish is too coarse, slow down the reactivity of the dip by adding sulfuric acid. Add nitric acid if the finish is too fine.

Memos on Brass—No. 27

The current shortage in materials and new equipment has given even greater value than ever before to the application of bronze welding for repairing cast iron and steel parts, and for building up wearing surfaces. Bronze welding requires much less time than welding with ferrous rods because the joint is actually made by "brazing" instead of true welding. The bronze welding rod alloys melt at much lower temperatures than the steel, cast iron or copper to be joined. It is only necessary to bring the clean base metal to a good red heat for adhesion to take place with the molten bronze.

ALLOYS OF COPPER

(Continued from column 1)

available in the simpler wrought forms, such as rod, bars, and heavy sheet. These higher aluminum alloys are very satisfactory as forging alloys. As forged, they have tensile strengths of 80,000 to 100,000 lbs. per sq. in., depending on heat treatment after forging. The alloy modified by the addition of silicon is also more readily machined than any of the other aluminum alloys. The application of these modified high aluminum alloys to uses involving hot forging and machining is increasing fairly rapidly, and these alloys bid fair to become much more generally used in the future for many applications requiring high strength and wear resistance.

Another factor often not recognized is the lighter weight of the copper-aluminum alloys as compared with other copper base alloys. The density values for the binary alloys are shown in the accompanying curves. Some of the modified higher aluminum alloys are as much as 10% lighter than commercial yellow brass suitable for forging and machining operations, and this factor together with an increase of from 30 to 60% in strength makes possible very desirable savings in the weight of finished parts.

NEW DEVELOPMENTS

A precision tapping machine has been developed which is said to permit precision tapping of up to ⅜-inch holes, including ⅛-inch pipe threads, to comply with standard specifications. It is also claimed to be adaptable for any type of manufacturing where No. 3 and No. 4 Class specifications are demanded. Four speeds are available. **(No. 310)**

Machine tool cabinets of steel construction, supplying twelve square feet of enclosed storage space, have been introduced, which feature full swinging, triple latch doors equipped with padlock hasp or built-in flat lock. Heavy gauge steel working surface can be used to hold small vises and grinders. **(No. 311)**

Standardized jig clamps have been put on the market which are described as quick-acting and adaptable to practically all manufacturing, tooling and fabrication requirements. They are constructed with drop forged clamping bars and handles. Line includes drill, jig draw, knife, toggle, and jig cam clamps. **(No. 312)**

A hand tool holder made to hold square or octagon shaped hand tools, such as stamps, chisels and similar devices, has been developed. It is said to hold any size piece from ¼ to ¾-inch and other ¼-inch ranges up to 1¼-inch square. **(No. 313)**

A comparator gauge has been introduced which is claimed to make possible accurate comparisons of duplicated parts for size. Readings of 0.0001 of an inch are possible on a dial indicator which has graduations 5/8 of an inch apart to permit interpolation between markings. The short range of 0.002 of an inch permits extreme accuracy in indicator movement, and no error greater than the width of the dial hand will be found, it is said. **(No. 314)**

An automatic thread milling machine is said to be unusually simple, lightweight and low-cost. Features include milling a thread from 5 to 40 threads per inch and metric 1 to 5 mm. pitches, left and right hand threads, internally and externally up to 7 inches in diameter all on one machine. Another model is even able to thread up to 155 mm. shells with a length of 24 inches. The machine is said to finish the thread automatically, come to a full positive stop and automatically disengage the thread milling cutter. One man can operate up to four such machines. **(No. 315)**

A graduated countersink is said to provide for positive countersinking to predetermined depths and to tolerances of 0.001 inches. This micrometer stop countersink can be adjusted by slight thumb pressure and is said to permit accurate cutting for flush rivets and screws without marring of metals. Cutters are available in ⅜- and ½-inch diameters either at 82 or 100 degrees. **(No. 316)**

This column lists items manufactured or developed by many different sources. Further information on any of them may be obtained by writing Bridgeport Brass Company, which will gladly refer readers to the manufacturer or other source.

PRODUCTS OF THE BRIDGEPORT BRASS COMPANY

Executive Offices: BRIDGEPORT, CONN.—Branch Offices and Warehouses in Principal Cities

SHEETS, ROLLS, STRIPS—*Brass, bronze, copper, Duronze**, for stamping, deep drawing, forming and spinning.

CONDENSER, HEAT EXCHANGER, SUGAR TUBES—For steam surface condensers, heat exchangers, oil refineries, and process industries.

PHONO-ELECTRIC* ALLOYS—High-strength bronze trolley, messenger wire and cable.

WELDING ROD—For repairing cast iron and steel, fabricating silicon bronze tanks.

LEDRITE* ROD—For making automatic screw machine products.

"Bridgeport" BRASS CO.

Established 1865

COPPER WATER TUBE — For plumbing, heating, underground piping.

DURONZE ALLOYS — High-strength silicon bronzes for corrosion-resistant connectors, marine hardware; *hot rolled sheets* for tanks, boilers, heaters, flues, ducts, flashings.

BRASS, BRONZE, DURONZE WIRE— For cap and machine screws, wood screws, rivets, bolts, nuts.

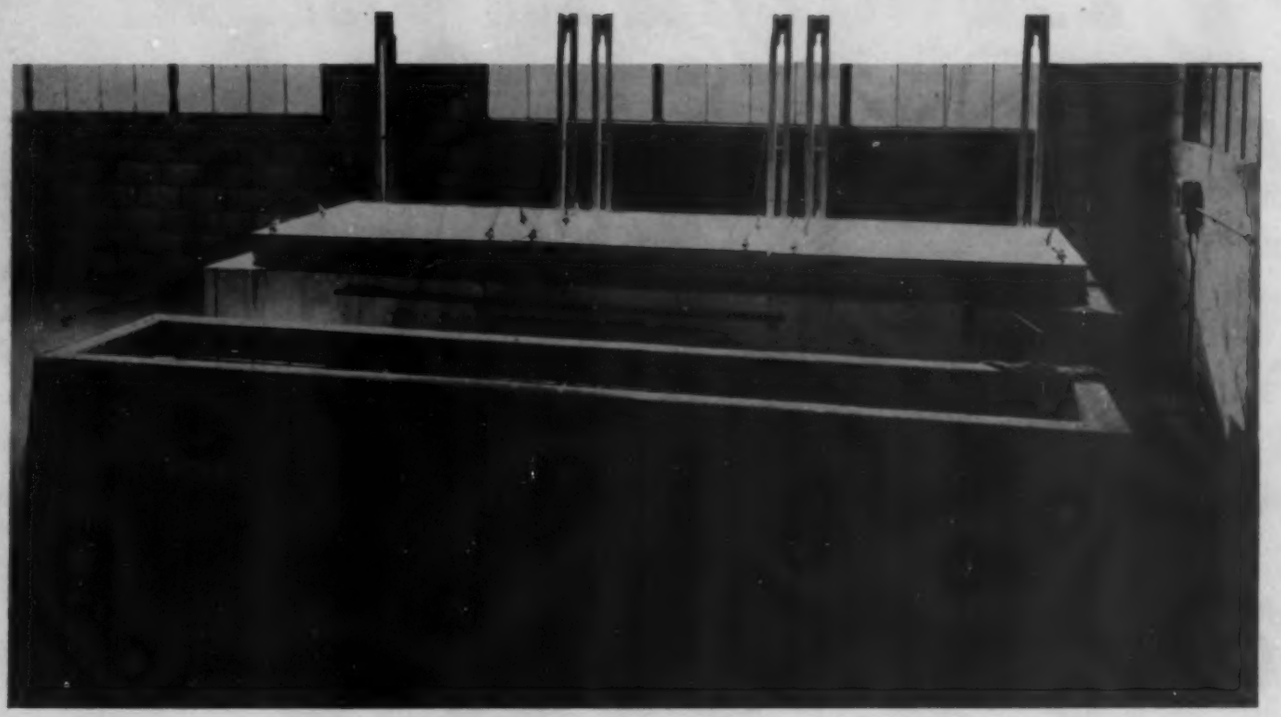
FABRICATING SERVICE DEPT.—Engineering staff, special equipment for making parts or complete items.

BRASS AND COPPER PIPE—"Plumrite"* for plumbing, underground and industrial services.

*Trade-name.

BRIDGEPORT BRASS

No "SACRED" ALLOYS Employed in the Bellis heat-treating of Aluminum Aircraft Parts



The BELLIS Salt Bath Furnace shown above serves the defense industries in a truly dual capacity. Aside from its all important function of heat treating aluminum sheets, rivets and other aircraft parts, its construction is such that its major components do not tax the vital alloys of limited output. The large pot, for instance, which is 16 feet long, 5 feet deep and 4 feet wide, is of welded steel boiler plate—***no nickel or chromium alloys being needed*** because the salt bath is heated internally. In starting up the bath, the salt is fused by means of electric heating units embedded in the water-cooled electrodes. After the bath becomes liquefied and a conductor of electricity, it is heated by passage of current between the electrodes, the resistance units being disconnected.

These exclusive and patented features are but a few of the many which form an integral part of *every* BELLIS Salt Bath Furnace. This and subsequent advertisements shall tend to expound these money and time saving features in detail . . . Should you prefer immediate information on any specific unit or the complete BELLIS line, we shall be glad to comply by return mail.

The Bellis Heat Treating Co.

Branford ***Connecticut***

● *YEARS AHEAD IN DESIGN . . .*

Prepared in peace - ready for war

Wars are won by getting there "fu'stest with the mostest"—whether it's men, material or the motors that back them up.

That's why a proved weapon—or motor—on the production line is worth many in the drafting room or proving laboratory. And that's why Westinghouse CS Motors, designed around fundamental features proved and perfected years ahead of war needs, are able to meet today's emergency demands.

CS Motor features are the outcome of Westinghouse experience in induction motor design that goes back to the first industrial use of alternating current. Hundreds of thousands of CS Motors in use for five, ten, twenty years and even longer, have proved their soundness.

Improved and refined but not basically changed, they, today, are universally accepted by industry. And today they enable Westinghouse to meet the enormously increased demands of industry at war. Check your nearest Westinghouse office. Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

J-21230

Westinghouse

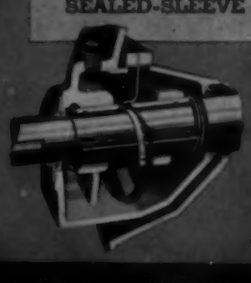
cs motors

TESTED by Time . . . PROVED by Experience

YEARS AHEAD
WITH
ONE-PIECE FRAMES

RIGID ONE-PIECE FRAMES were introduced by Westinghouse in 1928 to protect against twisting strains and vibration. An important feature then—even more important today.

YEARS AHEAD
WITH
SEALED-SLEEVE BEARINGS



SEALED-SLEEVE BEARINGS, a long-life design feature introduced by Westinghouse in 1925, seal oil in—dust and dirt out.

YEARS AHEAD
WITH
IMPROVED INSULATION

Since 1930, TUFFER-NELL insulation has given extra dielectric strength at vulnerable spots. Westinghouse radio-frequency test checks every turn in windings.

...PROVED AND APPROVED BY PERFORMANCE

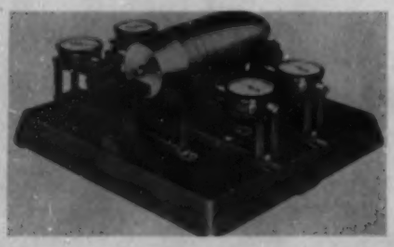
Industrial Equipment

Blackout Awning

Acklin Stamping Co., Toledo, O., announces a new Meta-Fold blackout awning suitable for industrial, commercial and even residential buildings. It is designed to be installed on the exterior of the building and is operated as simply as the old-time roll top desk. As shown in the accompanying illustration, by lowering it half-way the metal awning provides sunlight protection. When fully lowered, it blacks out the window completely. Entire awning is rust-proof and fire-proof and can be provided with an inside lock. Besides cutting off light, the development is said to protect windows against bomb blasts and flying splinters. It is finished in neutral nonglare colors.

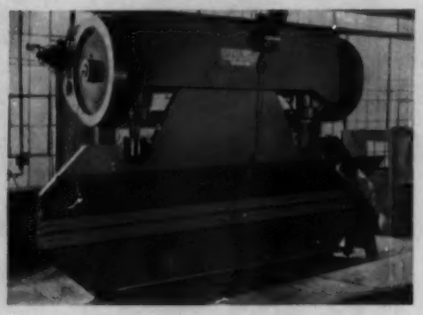
Diameter Gage

Federal Products Corp., 1144 Eddy street, Providence, R. I., has introduced a model 236 B-95 mechanical shell diameter gage for checking four diameters independently of each other. It also can be built so that more or fewer diameters can be checked. Each indicator of the gage and its opposite anvil, which contacts the shell, is a separate and integral unit, mounted on flat springs allowing it to adjust itself independently of any other indicator on the gage. Indicators do not contact shell directly but through pantograph spring units, which protect the indicators and make adjustments easier. Shell and projectiles up to approximately 14 pounds can be rotated manually with comparative ease on the V block of the instrument. The gage is fast and entirely mechanical.



Bending Press

Steelweld Machinery Division, Cleveland Crane & Engineering Co., Wickliffe, O., announces a new model L5½-12 bending press featuring a double bed and ram extension for bending and forming plate up to 20 feet in width. Thicknesses handled depends upon the plate width. For example, it will bend ½-inch plate up to 12 feet in width and heavier if the plate width is less. Frame of the unit is of one-piece all-welded steel construction. All gearing is protected by metal enclosing covers. Two steel eccentrics, one on each end of the machine, operate the ram. Each has three extra large main bearings and an eccentric bearing. The bearings are lubricated automatically by two pressure-type oiling units mounted on either end of the machine. Main drive clutch, heavy multiple-disk type, is easily adjusted without tools. A clutch, a duplicate of the main clutch, is used as the brake.

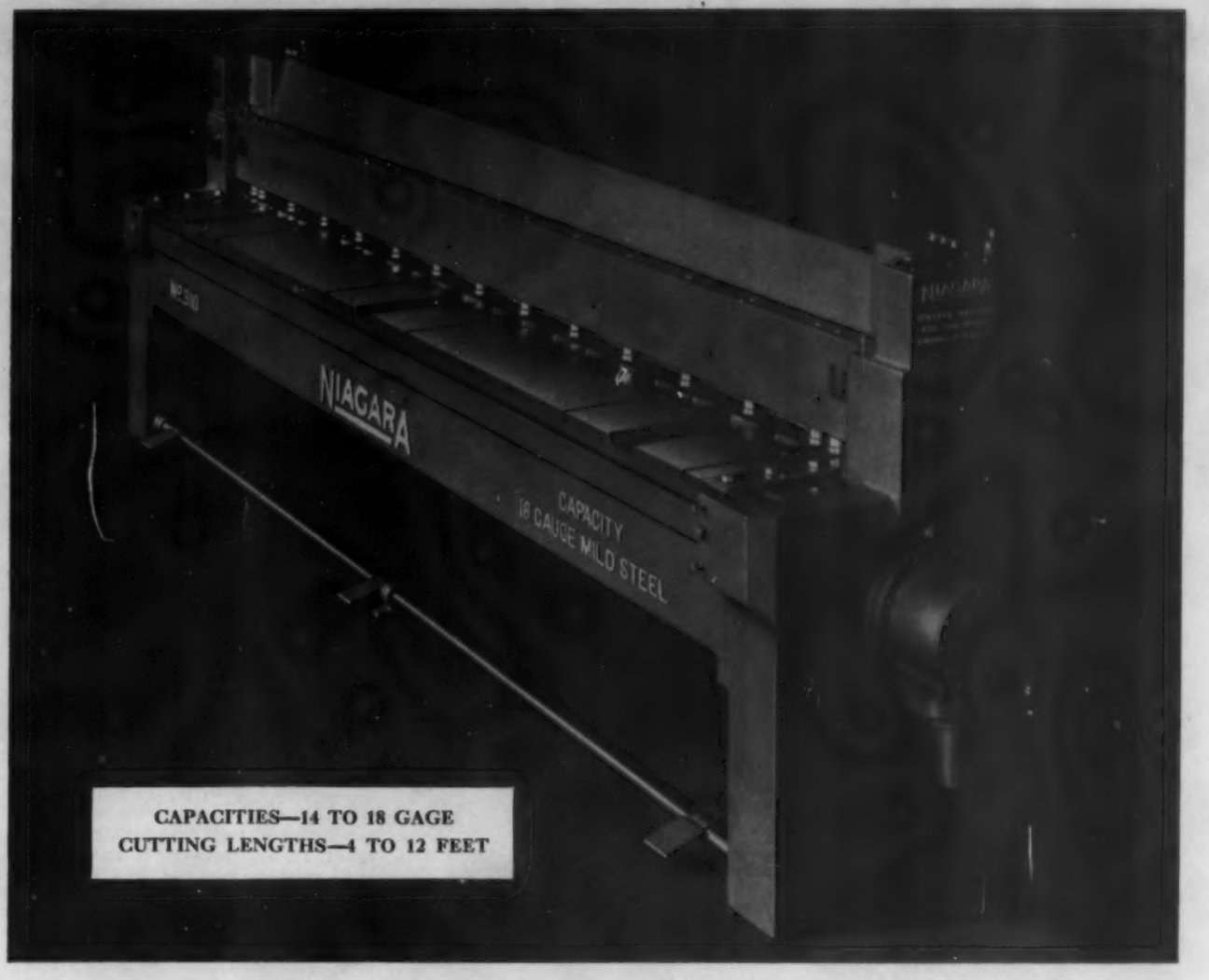


Painting Machine

DeVilbiss Co., 300 Phillips avenue, Toledo, O., has introduced a 2 and 3-station machine for painting exterior and interior surfaces of component parts of the M54 4-pound incendiary bomb. It consists of a fully automatic spray station for exterior painting, one or two semi-automatic spray stations for interior painting, and a chain-on-edge spindle-type conveyor. After cases are placed on the workholders of this machine, they move into the first spray station where, as they are rotated, their exterior surfaces are automatically painted. Then, without stopping, they pass over a section of the conveyor which is long enough to provide a 5-minute drying period. Fully dry for handling, the bomb body components reach the unloading station where they are removed from the workholders, two at a time, and placed on the stands in the semi-automatic spray stations. Then, moving extension guns automatically coat their interiors.

Demand Regulator

T. Starling Winters, 100 East Palisade avenue, Englewood, N. J., has developed a self-contained automatic kilovolt-ampere demand regulator designed to meet the requirement of regulating kilovolt amperes with varying power factor. It operates directly from instrument transformers, eliminating need for a separate watthour meter unit. The unit uses a vacuum-sealed mercury switch to eliminate contact arcing and burning, chattering of electrode control contactor and false operation. Friction of moving parts is maintained at low and constant values by the use of jewel bearings. The wide range of demand adjustment (6:1 range) of the regulator permits large changes in installed equipment capacity to be handled by the same instrument transformers. Regulator is set by means of an adjusting knob and is calibrated to read directly in kilovolt amperes. Dust-tight construction of the case and glass cover contribute to its accuracy. Units are normally furnished with 120-volt potential coils and 5-ampere current coils for use with instrument transformers on 60-cycle circuits. The instrument



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Speed Up Wartime Output

This series of Niagara Power Squaring Shears offers many new and exclusive improvements resulting in new standards of cutting accuracy, high production, and freedom from costly down time.

They operate at a speed of 80 strokes per minute. Instant acting Niagara sleeve clutch, ball bearing self-measuring back gage, full visibility of the cutting line, and convenient handling of sheets speed up squaring and trimming.

The sloping back of the bed acts as a chute for directing off-cut material to rear.

Drive mechanism including flywheel, gearing, clutch, eccentrics and connections is enclosed and operates in oil, thus assuring long life, low maintenance cost and utmost safety. Motor is direct connected.

A new detent device requiring no attention or adjustment replaces the customary friction brake.

Standard equipment includes front, side and back gages, and four-edge, solid tool steel knives.

NIAGARA MACHINE & TOOL WORKS, BUFFALO, N. Y.

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—THAT'S THE IMPROVED, RADIO-FREQUENCY TESTED INSULATION THAT'S HELPED KEEP WESTINGHOUSE CS MOTORS YEARS AHEAD!

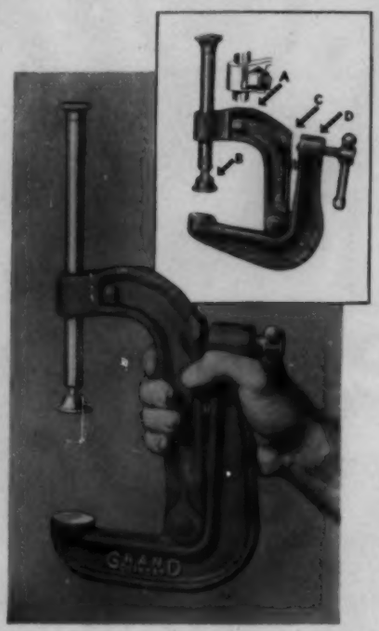
WESTINGHOUSE

SEE PAGE 92 AND PAGE 93

was primarily developed for the demand control of electric arc furnaces that are operated by power metered on a recorded kilovolt-ampere demand basis.

Speed Clamp

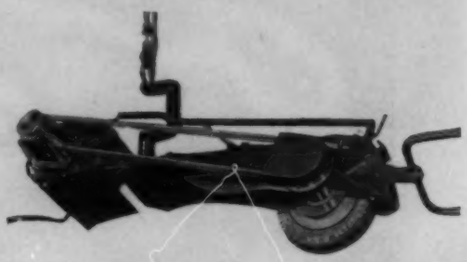
Grand Specialties Co., 3103 West Grand street, Chicago, has placed on the market a fulcrum leverage speed clamp called Quikcet which features 4-second and one hand operation. This is done by setting it with a ratchet rod instead of a turn screw. In the illustration, A is the spring activated pawl for ratchet. B is the replaceable swivel. The case hardened casting C contacts vise-like, tightening



screw with fulcrum action providing downward pressure on work. Side screw tightening permits clamping in close quarters and also quick release. Rod and screw are copper plated and V shoes may be furnished for pipe and rod holding applications. Work cannot slip from the unit even if it has beveled edges, according to the company.

Swing Frame Grinder

Vonnegut Moulder Corp., 1806 Madison avenue, Indianapolis, is offering a new Marschke swing frame grinder for ingot, billet and slab grinding in steel mills and foundry snagging operations. Its design features an all steel combination of welded plate and drawn tubing construction. The grinder has a smooth spindle rotation derived from fitting large size ball bearings into a large wheel head housing. It has three spindle speeds and includes special protection of spindle bearings, motor pulley and all adjustments from damaging actions of sparks and abrasive grit. Wide variations in operating conditions are met by provisions for easy angling of the wheel head up to 90 degrees from vertical both to right



and left, and for adjusting the handle to most convenient "low" and "high" grinding positions. Standard equipment includes a totally enclosed fan-cooled motor with push-button start and stop station conveniently mounted on top the wheel guard, and 20 feet of insulated cable which is provided with thermal overload relay and low voltage release. The grinder is available for 16, 18, 20 and 24-inch wheels powered with motors ranging from 7½ to 25 horsepower.

Control Unit

Foxboro Co., Foxboro, Mass., has introduced a control unit for controlling remote valves, dampers, and other pneumatically operated equipment. In appearance, it harmonizes with the rectangular case in which the company's recording and controlling instruments are enclosed. When the unit is flush-mounted, its front surface is only 7/16-inch from the surface of the instrument panel, and as its setting knob and pressure indicator are recessed, there are no protruding parts. Specific-

ally designed for dead-end service, the remote valve control unit will hold reduced pressures, dependably,

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When You Order a PORTER Fireless

Porter Fireless Steam Locomotives are designed and built to give you something extra for every dollar you invest in them. In addition to the features listed, you get quiet operation, cleanliness and safety.

If steam is available in your plant, a Porter Fireless can save up to 50% in haulage and switching costs. They are available in direct or geared types, in sizes from 10 to 100 tons. Write for complete information.

ONLY PORTER BUILDS A COMPLETE LINE OF LOCOMOTIVES FOR INDUSTRY

DEPENDABLE DELIVERY

You can count on the delivery promise for a Porter Fireless, since no critical materials such as diesel engines, electric motors, etc., are required.

SIMPLE OPERATION

There are no complex controls in a Porter Fireless. New, unskilled employees learn to operate and service the locomotives quickly. Porter Fireless locomotives are rugged and cannot be damaged by inexperienced operators.

LOW OPERATING AND MAINTENANCE COSTS

A Porter Fireless uses low cost steam produced in stationary boilers, for fuel. Charging can be done during idle periods. No night or week-end attendance is necessary. Fewer working parts mean fewer repairs. There is no boiler or firebox and reservoir never needs replacement.

LOW INITIAL COST

A Porter Fireless costs less than most other types of locomotives. It does not require diesel, electric or other motors. There is nothing to make initial cost high.

LONG LIFE

The first Porter Fireless was placed in service in 1914, and is still working efficiently.

PORTER better built locomotives

H. K. PORTER COMPANY, INC.
PITTSBURGH • PENNSYLVANIA

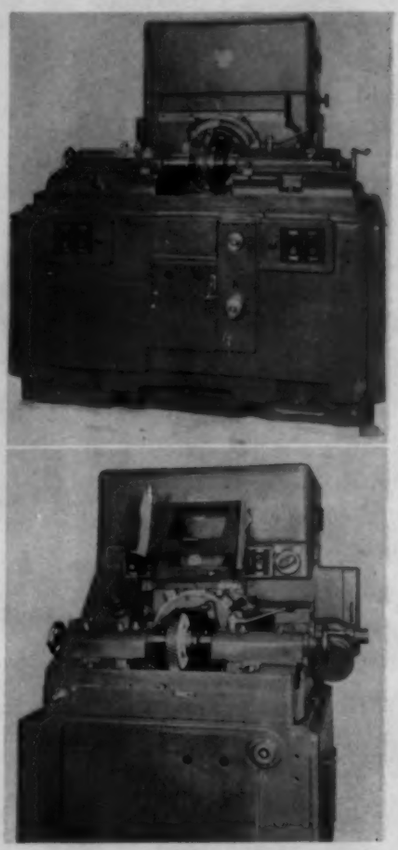
to valves within very narrow limits. It is practical for operation over distances as great as 1000 feet, according to the company.

Welding Timer

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., announces a new weld and sequence timer for use in automatic resistance spot, butt, or projection welding. Housed in a steel, wall mounted enclosure of black crinkled finish, it is 17¼ inches high, 12 inches wide and 12 inches deep. Individual timing circuit, adjusting potentiometer knobs and dials, repeat and nonrepeat switches and tubes are mounted on a dead front panel. The control transformer is wound for 115/230/460/515 volts, 50/60 cycles. The solenoid relay is rated 25 amperes at 110 or 220 volts and 10 amperes at 440 or 550 volts. The timing circuit is fully electronic and consists essentially of a resistor capacitor circuit whose charging rate is adjustable by varying a resistor. The voltage of the circuit is applied to the grid of a thyratron tube so that after a predetermining charging time has elapsed the thyratron is energized and operates the relay. The timer divides total time of a weld into the various intervals in which the welder goes through its operating sequence and includes a "weld" period of 3 to 30 cycles when the full welding current flows. When welding thick plates, brass, or stainless steel, timing facilities permit intermittent heating and cooling steps of 3 to 30 cycles.

Gear Finishing Machines

Fellows Gear Shaper Co., Springfield, Vt., recently placed on the market two new gear finishing machines, one known as the No. 12 and the other No. 24. The No. 12 is of extremely compact and rigid design, and is arranged with complete electrical control. It is operated through push buttons located at the front. These control the rotation of the tool in both directions, as well as reciprocation. The tool is advanced into the work by



a feed cam, and the standard cam is so arranged that the tool makes two complete cycles and then stops automatically. Push buttons also are provided for controlling rotation direction of the tool. The stroke length of the reciprocating tool slide is controlled through dogs and micro-switches. Safety switches are included to stop the machine automatically in case of failure of the other units. A timing switch governs the period of "dwell" at the ends of the stroke where reversal of direction of the finishing tool takes place. The No.

The Heart of the Mechanism is the

H&S WORM GEAR SPEED REDUCER

☆ Furnace doors open or close at the touch of a button . . . electric power and Horsburgh & Scott Worm Gear Speed Reducers offer many advantages for this important function. Among these are ease of control, simplicity of operation, economy of space and extremely low maintenance. ☆ H. & S. Speed Reducers offer many savings and advantages throughout the range of industry . . . it will pay you to inquire.

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GEARS AND SPEED REDUCERS

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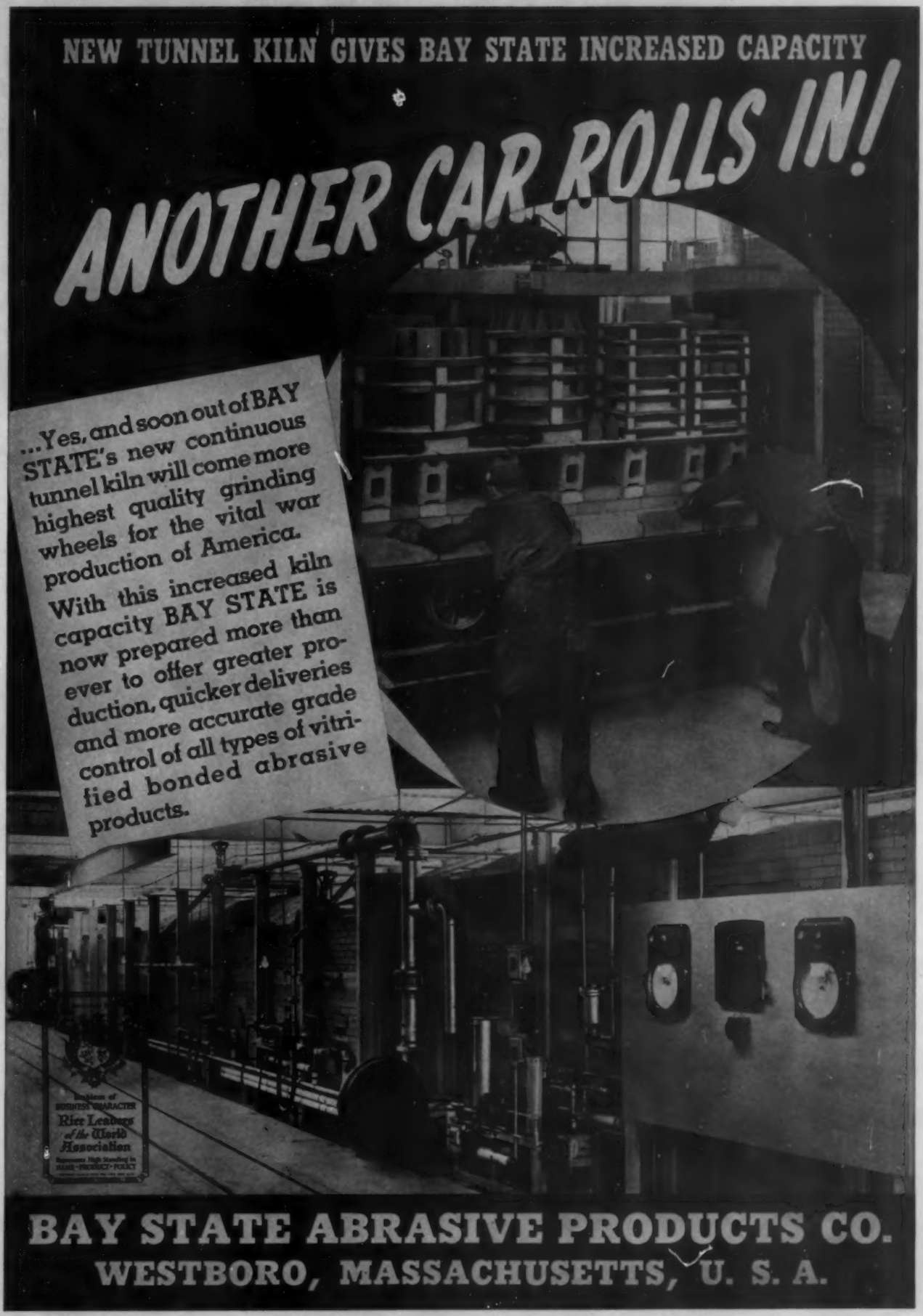
NEW TUNNEL KILN GIVES BAY STATE INCREASED CAPACITY

ANOTHER CAR ROLLS IN!



...Yes, and soon out of BAY STATE's new continuous tunnel kiln will come more highest quality grinding wheels for the vital war production of America.

With this increased kiln capacity BAY STATE is now prepared more than ever to offer greater production, quicker deliveries and more accurate grade control of all types of vitrified bonded abrasive products.

Member of BUSINESS CHARACTER Rice Leaders of the World Association

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toward
VICTORY

World War II found INGACLAD
Ready to Help Conserve Vital Alloys

Industries Served by IngAclad include:

Baking
Beverage
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Food Service
Meat Packing
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Pulp and Paper
Soap
Sugar Refining, and
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In addition, IngAclad is widely used for Shipping Containers, Laboratory Table Tops and in a variety of Architectural Applications

● More than 10 years ago, a method of conserving vital alloys was developed by the Ingersoll Steel & Disc Division of Borg-Warner Corporation.

● This achievement in steel makes possible a saving of as much as 80% in the stainless steel required for many jobs.

● With a record of more than 10 years of continuous satisfactory service in the Process Industries, it is now performing a valuable service to the Allied cause.

● Not only does IngAclad conserve vital alloys, but also effects marked economies in material costs.

● Ease of fabrication and welds that are good for the life of the equipment are also characteristics of IngAclad.

● The reason IngAclad is so satisfactory in combating corrosion is that it is not a *substitute* for stainless, but actually is solid stainless steel applied uniformly and inseparably to mild steel.

We Produce
Solid Stainless, Too!

As producers of both the solid stainless metal and Stainless-Clad Steel, we are able to advise you, without prejudice, as to which material is more practical for the particular service required.

If your stainless requirements are essential to the Nation's victory program and permit the necessary priority rating, we will do our very best to serve you. Inquiries are invited.

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INGACLAD
STAINLESS-CLAD STEEL
"A Borg-Warner Product"

24 machine differs slightly in design but is provided with similar electrical control apparatus, and also is "push button" operated. On both machines, the work is supported on "live" centers held in adjustable head and tailstocks. The table, carrying the latter two devices, is adjustably mounted on the base so that taper in gears can be corrected. Capacities are: No. 12 machine, maximum pitch diameter 12 inches, face width 3 inches, 6 diametral pitch. No. 24 machine, maximum pitch diameter 24 inches, 5 inches face width, 4 diametral pitch.

End Brush

Osborn Mfg. Co., Hamilton avenue, Cleveland, announces a new power-driven end brush designed particularly to facilitate cleaning of slag, scale, or oxidation from welds on inside corners as well as other difficult locations. It will get into any space or corner which is accessible for welding. Feature of the brush is it can be used in all standard power tools, whether air

or electric. This facility is permitted by a special holder which permits instant replacement of brush part. The brush proper measures only ⅛-inch across the end, and may be obtained with any one of three diameters of wire—0.025-inch for type No. 91-S-2 brush, 0.035-inch for type No. 91-S-3 and 0.090-inch for type No. 91-S-4.

Tap Reconditioner

Detroit Tap & Tool Co., 8432 Butler street, Detroit, announces a tap reconditioner which combines in one unit facilities for chamfering, spiral pointing, and for point polishing. It also is said to reduce tapping costs by increasing output per tap during its useful life. The tap chamfering unit, located at left of the machine is of the collet type. It will accommodate collets from the smallest machine screw size up to the 1¼-inch standard tap shank size. Also, taps of 2 to 7 flutes may be handled through the provision of an indexing drum. Safety stop pins limit movement of the chamfering unit for

(*Please turn to Page* 117)

Heavy Forgings

(*Continued from Page 77*)

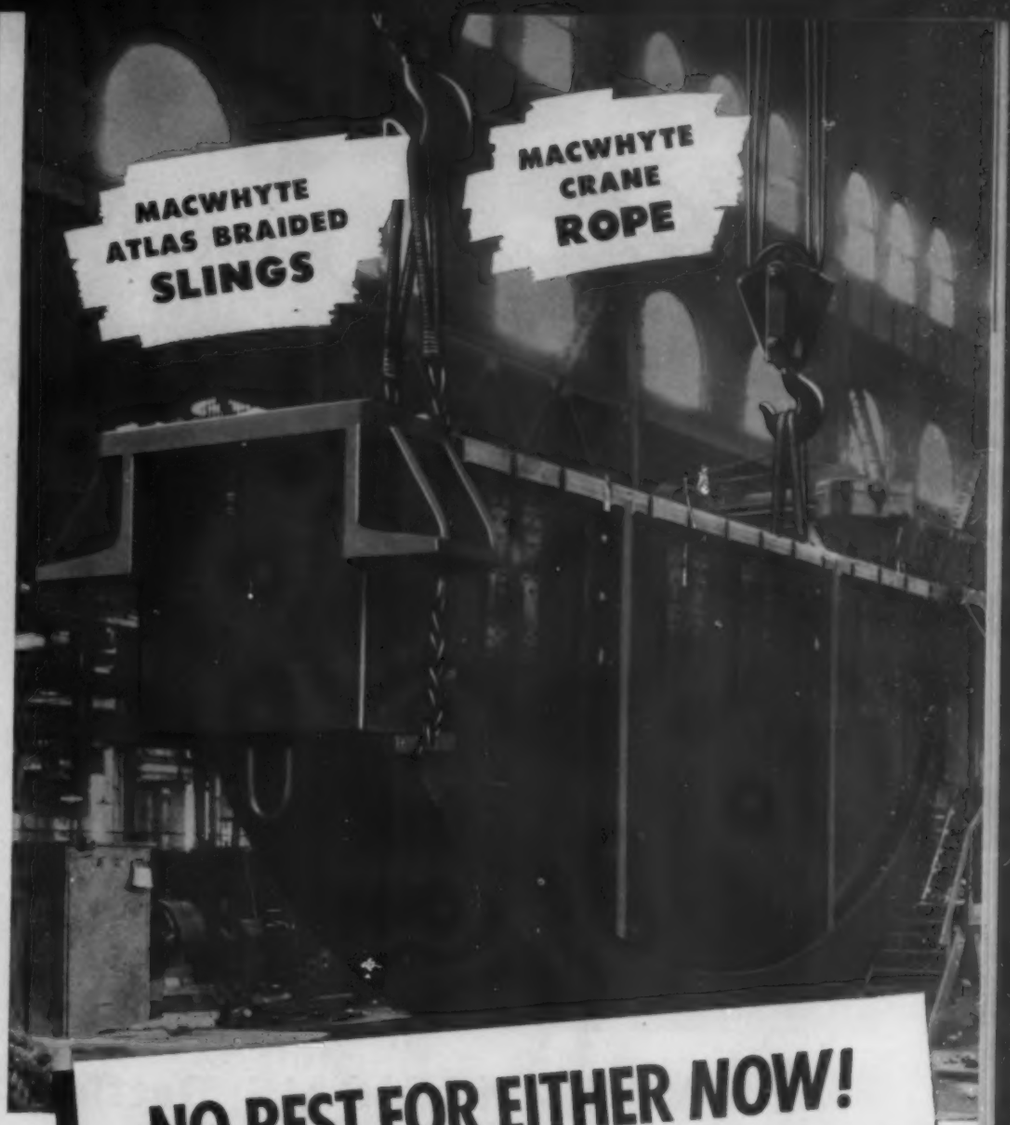
tigations (8), (9), (10), (11), (14), (15) on forged and heat-treated steel bars, that the transverse impact strength should be between 30 and 70 per cent of the longitudinal impact strength if the ingot was of high quality and forged up to the cross-sectional reductions from the ingot of 70 to 1 or 98.5 per cent. However, in forgings made from ingots having an inferior quality, the transverse impact strength might be as low as 15 per cent of the longitudinal.

Apparently only one case has been reported, by Steudel (16), in which the transverse strength of a steel forging was considerably lower than the longitudinal strength. An experimental heat-treated nickel-manganese steel crankshaft possessed an ultimate strength of 110,000 pounds per square inch with the fiber, but only of 70,000 pounds per square inch across the fiber. Various other alloy steel crankshafts had the same strength in both directions, but showed differences in elongation and contraction in area.

An interesting observation which might have some bearing on the properties of heavy forgings was made by Ellis and McDonell (17) who found that the impact values of a flat hot-rolled 0.10-per cent carbon steel bar appear improved by quenching when tested longitudinally but lowered transversely.

In evaluating the results of such investigations, it must be kept in mind that the ductility values of a steel forging generally decrease from the outside to the core. This is partly caused by the inferior quality of the metal in the core, which contains segregations and remainders of the pipe, or centerline porosity. Also, the actual reduction in forging is usually higher at the surface than in the core, resulting in corresponding differences of properties (9) (10) (14); and these in turn might considerably depend upon the method of forging.

Regarding the effect of forging temperature on the development of a fibrous structure, visible on rupturing and in micropictures, Schmitz and Knipping (18) (19) observed that hypoeutectoid (low and medium-carbon) steels only develop a wood-fiber break if forged below the upper critical, or with ferrite present, and if cooled sufficiently fast to prevent recrystallization. Hypereutectoid (high-carbon) steels show the wood-fiber break only when the forging temperature is below or little above the lower critical temperature. Such steels also show the fiber in photomicrographs. The lower the forging temperature, the less uniform is the reduction of various parts of the forging. No mechanical tests, however, were performed in order to correlate fiber



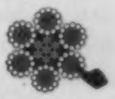
NO REST FOR EITHER NOW!

Men can't stand the hours CRANE ROPES must stand today. In many plants Macwhyte Crane Ropes now work 24 hours a day, 7 days a week . . . and they're ever on the alert!

Get such tireless crane ropes for your job. Get speed and safety with Monarch Whyte Strand PREformed . . . a crane rope with highest strength, one that resists wear and fatigue. It's a tough rope especially made for today's tough job.

Tell us the make, model, and capacity of your crane . . . and we'll give you the correct rope for it: Monarch PREformed.

Outer wires in each strand are Macwhyte PREformed's first line of defense. They have maximum tensile strength, great abrasion resistance.



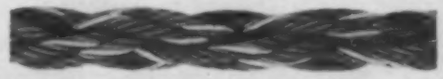
Inner wires in each strand are the reserve strength of the rope. They are specially drawn with maximum flexibility and toughness for inside service.

Slings to s-p-e-e-d your loads SAFELY are Macwhyte Atlas Braided Slings. There's no better auxiliary crane equipment.

Made from both left-&-right lay endless wire rope construction (see illus.), Macwhyte Atlas Slings have:

1. Perfect balance that eliminates spinning.
2. Extreme flexibility; handle like a silken rope; resist kinking.
3. No splices to wicker.
4. Positive safety of endless wire ropes.

Macwhyte Atlas Slings are time savers, labor savers, property savers, and even life savers. They're used all over America to handle pipes, shapes, bars, armament, machinery, rolls, etc.



Today you MUST step up production SAFELY. Let Macwhyte Atlas Slings help you. Write on company letterhead for helpful rigging bulletins.

CRANE ROPES to hoist the load . . .
BRAIDED SLINGS to harness it safely. *BUY BOTH FROM*

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Helping KEEP THE KILOWATTS flowing

TO WIN AMERICA'S Battle of PRODUCTION

PRODUCTION is now our number one job. Victory will go to the nation with the most machines and the power to run them.

In winning this war of production, CAREY HEAT Insulations are performing an important and essential part—conserving America's fuel resources—conserving man-power, machine-power, money-power . . . meeting the new strains and stresses of increased temperatures and pressures for higher and still higher power-production efficiency.

Now, at a time when the last ounce of power is urgently needed, it is essential that time tried methods and materials be used for the conservation of heat and fuel. CAREY Insulations have proved their outstanding performance in hundreds of power plants throughout the nation. They meet every service condition, from sub-zero to 2500°F.

Whatever your insulation problem, make certain of correct and lasting results by specifying CAREY Insulations. A nationwide organization is at your service. Write for details, address Dept. 71.

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structure and transverse strength properties.

Thus, regarding the effect of various factors on the properties of steel forgings, the following somewhat uncertain conclusions might be drawn at the present:

First, the properties in the direction of fiber are generally improved by forging, particularly by reductions up to 3 to 1 in cross section from the ingot and to a slight extent also by reductions up to 10 to 1.

Second, the properties in the transverse direction might be favorably or unfavorably affected by forging, but the highest possible values are obtained with high quality ingots and small reductions.

Third, inherently soft or low-carbon alloys appear to yield better transverse properties than harder alloys.

Fourth, a fine-grained ingot should result in better cross grain properties than a coarse grained ingot. It is for this purpose that forgings are frequently made from grain refined steel ingots. Generally killed, ladle-deoxidized steel is used, showing a minimum of segregation.

Fifth, other favorable factors are a high forging temperature, slow penetrating pressure in a hydraulic press and probably also the use of tools which enclose the work (swaging dies in preference to flat and V-dies).

Endurance Properties: Few data are available on the relation between the fatigue strength of steel forgings in the longitudinal and transverse directions. Aitchison and Johnson (5) forged various steels down to flats and found the fatigue strength of specimens taken in the lateral direction of the slabs, in both the normalized and heat-treated conditions, averaged 10 per cent lower than that of specimens taken in the longitudinal direction. On the other hand, values of impact strength in the lateral direction ranged between 80 and 30 per cent of those in the longitudinal direction.

These results are not quite conclusive as the lowest values in flats must be expected in the true transverse direction which is perpendicular to the surface of the flats, and such specimens were not tested.

Johnson (20) (21) found the fatigue strength of nickel-steel crankshafts, having an ultimate strength of 139,000 pounds per square inch, to be 78,000 pounds per square inch in the longitudinal and only 58,000 pounds per square inch in the transverse direction. This directionality is almost as large as that of the impact strength which had the respective values of 59 and 36 foot-pounds.

Schmidt (22) reported that in forged bars (reduction between 4 to 1 and 22 to 1) of a nickel-chrome-

moly steel, the fatigue strength in the transverse direction was only 15 per cent or less below the fatigue strength in the longitudinal direction. This was true for both smoothly ground and for notched specimens.

It is interesting to learn, in this connection, that wrought iron plate (23) with its pronounced directionality has been found to possess an ultimate strength of 46,500 pounds per square inch and a fatigue strength of 27,000 pounds per square inch in the longitudinal, and an ultimate strength of 36,000 pounds per square inch and a fatigue strength of 22,000 pounds per square inch in the lateral direction. It is rather surprising that the strengths in the lateral direction are so high, but again it must be considered that the true transverse direction is perpendicular to the plate surface. Carburized pieces of the wrought iron possessed only a slightly lower longitudinal fatigue strength but were more prone to break in the fillet than carburized ingot iron.

The effect of inclusions on the longitudinal fatigue strength is rather low and probably increases considerably with the strength level of the steel. Inclusions which are at the sensitivity limit of the magnaflux test have, according to Johnson (24), little influence on the fatigue strength of SAE X4330 steel, heat treated to various strength levels between 150,000 and 200,000 pounds per square inch. However, in a really "dirty" nickel-chromium steel (21), heat treated to a strength level of 150,000 pounds per square inch, the fatigue strength might be as low as 64,000 pounds per square inch or 20 per cent below the fatigue strength of 80,000 pounds per square inch of the clean steel. A sulphur content up to 0.18 per cent in SAE 1010 rivet steel (25) (26), resulting in corresponding "dirtiness", did not have any effect on the fatigue strength.

In determining the fatigue properties of forgings, it has to be considered that the common small fatigue specimens yield considerably higher fatigue strength values than tests on the complete forging or test bars having a large section (27) (28). Thus, the fatigue strength of a 6.5-inch diameter forged steel bar tested as a whole was found by Horger and Neifert (27) to be only 17,500 pounds per square inch as compared with 33,000 pounds per square inch for a 0.3-inch diameter test bar (27), Fig. 3. This has been found to be true also for the fatigue strength of notched bars, being otherwise geometrically similar (28) (29) (30) (31) (32).

According to these tests, notches and holes reduce the fatigue strength of steels generally more, the higher the ultimate strength of

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ROUND . . . FLAT . . . SHAPED

THIS STEEL "RIBBON" Outpulls a sashweight and saves Metal too!

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the steel and the sharper and deeper the notch. Other "stress-raisers" which adversely affect the fatigue strength of forgings are additional corrosion and the chafing or fretting action present in axle-seats, bearings, etc. Sachs (33) reports that a 10-inch diameter crucible-steel piston rod broke in service under a stress of only (plus and minus) 4500 pounds per square inch, while the fatigue strength of small specimens was approximately 55,000 pounds per square inch. This piston rod possessed a transverse bore, subject to corrosion by the coolant, and contained very high residual stress introduced by oil quenching.

Horger and Buckwalter (34) (35) (36) extensively investigated the reduction of the fatigue strength of railway axle steels by the action of the axle seat, and the partial elimination of this effect by surface rolling, flame hardening, relief notches, and other means. The main factor which counteracts the damaging effect of stress raisers is the presence of residual compression at the surface (37) (38).

Mechanical Properties of Light Metal Forgings: Contrary to steel, the ultimate strength of test specimens taken from a light alloy (aluminum, magnesium) ingot is much lower than that of specimens taken from forgings, extrusions or rolled products (1), and the former also possess a much lower ductility. It is necessary to subject a light alloy ingot to substantial reductions in cross-sectional area from the ingot, say of the order of 5 to 1 and up to 10 to 1 (80 to 90 per cent), in order to obtain the high and consistent mechanical properties of their wrought products. This applies as a general rule only to the properties parallel with the fiber, while the factors which govern the transverse properties are not well known, as yet.

However, aluminum alloy forgings possess, as a rule, a more pronounced directionality than steel forgings. Steudel (16) reports transverse strength values in heat-treated aluminum-alloy forgings as low as 20,000 pounds per square inch, as compared with a longitudinal strength of approximately 70,000 pounds per square inch. Such alloys possess a rather low ductility, contrary to most steels, and any decrease in ductility therefore affects the strength, as schematically illustrated in Fig. 5.

The properties of a forged and heat-treated aluminum alloy (14ST) billet 5 inches square were, according to an investigation by Mechling and Jack (39), as follows. The ultimate strength and yield strength were approximately equal in the directions with and across the fiber. The respective elongation values were 12 and 7 per cent, and the respective fatigue values were 18,000 and 12,000 pounds per square inch. Few differences were observed in the properties of a flat, ¾ x 6-inch, uralumin (24 ST) bar in the longitudinal and lateral directions.

Forged aluminum alloy wheels or disks, according to Sachs (1), possess extremely low transverse strength below 10,000 pounds per square inch—that is, in the direction parallel to the axis—if upset from a cast billet. While it is necessary to upset by 80 to 90 per cent of the height to obtain the common high strength values in the longitudinal direction or any direction in the plate of the disk, this large upset reduces the transverse strength. This effect is less pronounced but also present in disks upset from preforged or extruded rod.

The low transverse strength is also responsible for the occurrence of flash cracks in aluminum alloy forgings (1). A flash is fundamentally part of an upset or drawn out plate, which possesses a little strength in the direction perpendicular to the parting plane of the forging.

The basis factors which determine the transverse strength of alumi-

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num alloys are not known as yet. It appears that inclusions are rather harmful in this respect (16). Thus alloys which are less heterogeneous and softer at the forging temperature show less directionality and more uniform transverse properties than the stronger alloys (1) (40).

By applying a suitable forging technique it is apparently possible to obtain aluminum alloy bars with a high transverse strength (39), while the transverse strength of extruded bars usually varies to a large extent over the length (1). Rolled bars apparently do not attain the same high strength across the grain as forged bars.

The directionality of magnesium alloy forgings and extrusions is very pronounced and increases with the basic strength of the alloy (41). The specified minimum transverse strength of forgings in various alloys is according to the German Aircraft Material Performance Sheets only 60 to 80 per cent of the specified longitudinal strength.

The fatigue of magnesium alloy forgings and extrusions also depends considerably upon the section size of the test specimen (41) (42).

The properties of magnesium alloy forgings are dependent upon numerous other factors which have practically no effect on other metals (41) (43). Among such factors are the sequence of the forging operations which determines the orientation of the magnesium crystals, the presence of residual stress, and the cooling rate. The preferred orientation which is generally present in wrought magnesium alloys is responsible for a crystallographic directionality of the properties which is superposed on the mechanical fibering previously discussed.

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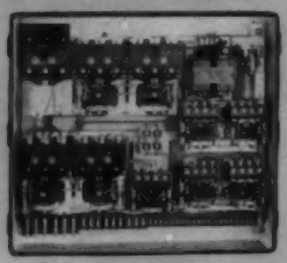

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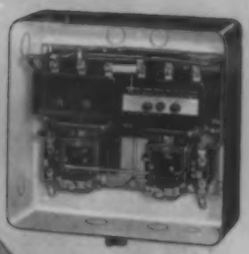

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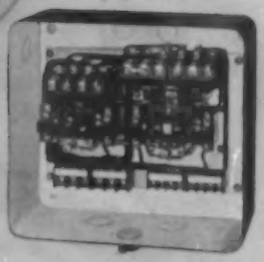

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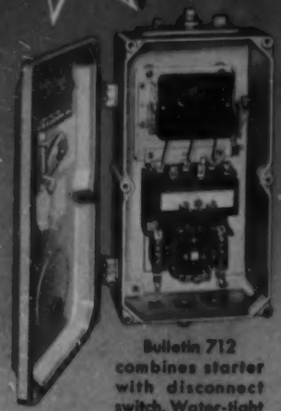

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Weldability

(*Continued from Page* 78)

parallel lines just inside the weld on the surface that will be in tension or by the angle of bend. Neither of these methods of expressing ductility is very good because of the inherent shortcomings in the free bend test itself.

Thin specimens exhibit a better ductility than do thick specimens. The author has seen many free-bend specimens ⅝-inch thick with ductilities varying from 80 to 100 per cent and on occasion even more, while the specimen showed a 180-degree bend absolutely pressed flat back upon itself. Other specimens 3 inches thick, made with the same welding procedure and including preheating to reduce the mass quenching effect, barely passed the 30 per cent minimum elongation required by the purchaser's specification. The weld metal, as was easily proved by an all-weld-metal tension test, was equally ductile in each case. Furthermore, a microscopic study of the base metal revealed good structure in the heat-affected zone.

Unfortunately the free-bend test is subject to widely varying results, depending upon the joint design. With good sound weld metal, the wider joint usually leads to better bend elongation although the per cent elongation will be lowered because of the limited increase possible after bending the test piece. That is, with several pieces cut from the same weld, different percentages of elongation will result from identical bends by varying the width of the scribed lines of the increment under study. The angle of bend, of course, is unaffected by the scribing practice although it is dependent upon joint design to a large degree.

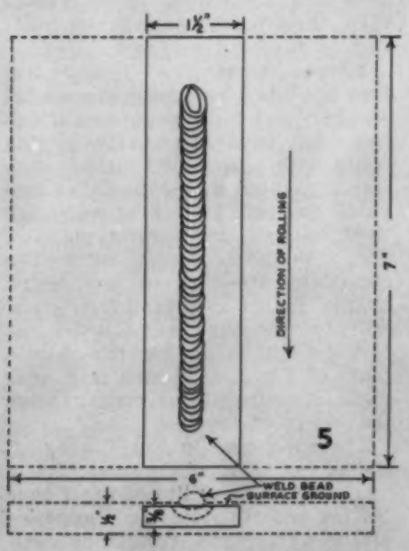

Fig. 5—Details of bead-bend test used by Jackson and Luther

Using the free-bend test to investigate weldability is not the best plan, for strong and brittle heat-affected zones in the parent metal may not fail in this test. Oftentimes the existence of a hard affected zone merely serves to force all of the bending to occur in the extremely ductile weld deposit without yielding any information whatsoever about the properties of the base metal whose weldability is under suspicion. Present-day practice tends to eliminate the free-bend test as a valuable factor in determining the weldability of steels.

Guided-Bend Test: The Navy recommended a guided-bend test to replace the free-bend test with its doubtful percentages of elongation and questionable bend angles. The Navy guided-bend jig provided a male and female jig which would

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bend a specimen in a predetermined manner to result in a "go" or "no go" joint insensitive to minor changes in testing and welding practice.

Now this guided-bend test is subject to most of the shortcomings of the free-bend test. As a means of discovering an exceptionally bad weld, the guided bend test has an established place in modern testing practice. Nevertheless, the differences in ductility brought about by changes in base metal composition are not of the type that lead to satisfactory evaluation in the guided-bend test. Therefore the guided-bend test must remain outside the pale of acceptable ductility tests used to determine weldability factors.

Bead-Bend Test: Without a doubt, one of the most important contributions to the subject of weldability as determined by ductility tests was that made by Jackson and Luther. And among the tests studied by them was the bead-bend test of Fig. 5. The bead is deposited in the direction of rolling, after which it is machined off and the entire face of the weld and the heat-affected zone is ground smooth. Then the ground face is tested in tension, using the Navy qualification jig previously mentioned.

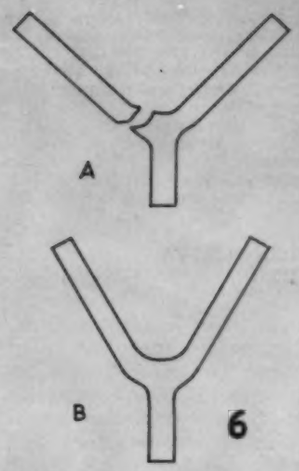


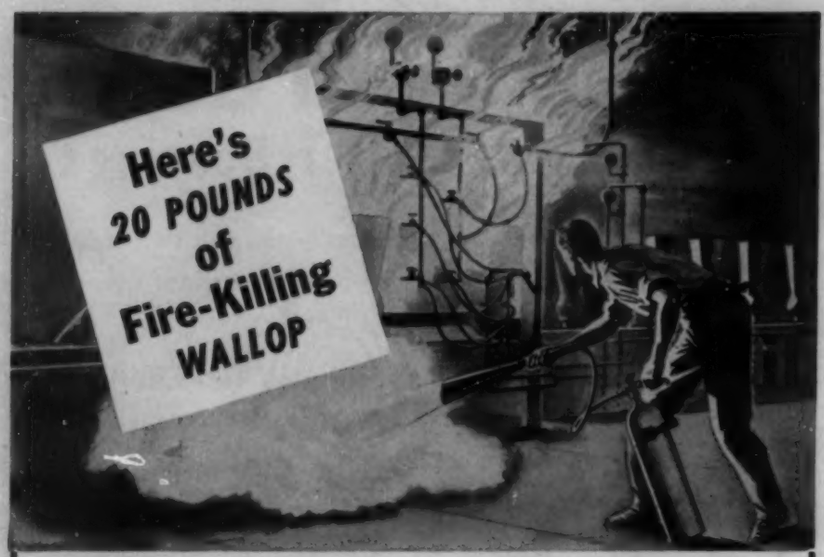
Fig. 6—Results of T-bend tests. Specimen A failed while specimen B passed

Using 175 amperes in one of these tests on the standard plate of Fig. 5 at 26 volts on a 3/16-inch diameter heavily coated electrode with a speed of travel of 6 inches per minute led to the results of Fig. 1. Ductility as measured by per cent of elongation steadily declined as the carbon content of the base metal increased to 0.35 per cent, after which an abrupt decrease in ductility occurred.

Standard test setups such as this one are quite valuable in the study of weldability through ductility measurements. Of course the value of this and comparable tests depends to a large extent upon the skill with which such fundamental information is translated to the conditions that are found in the actual welding work on real structures. The tests do, however, furnish valuable clues that make the establishment of workable welding procedures and techniques more certain than they would be without tests such as the bead-bend test.

T-Bend Test: The T-bend test first described by Bissell, represents another "go" and "no go" test which has been used extensively by the Navy with a modified qualification test jig suited to the needs of this particular test. Here fillet welds are used to join the upright piece in Fig. 2 to the horizontal piece. The specimens are cut out and tested in the jig to ascertain the weldability of the base metal under the test conditions. Either the ½-inch plate of Fig. 2 or ¼-inch or ¾-inch plate is selected, depending upon the object of the test.

The specimens in Fig. 6 are "A", a "no go" test piece; and "B", a "go" piece. The utility of the T-bend test is not restricted to acceptable and non-acceptable results, as Jackson and Luther have developed the same type of information from both



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the bead-bend and the T-bend tests. In fact the T-bend test results may, if anything, be somewhat more definite and less subject to scatter than are the bead-bend figures, provided that failures in the T-bend test caused by laminations in the plate are excluded from consideration.

It must not be inferred that the T-bend may only serve as a "go" or "no go" test. As a matter of fact there is an excellent correlation between the angle of bend at maximum load and the carbon content, or to be more general, the weldability. Certainly the work that has been completed on the T-bend test establishes this method as providing a true insight into the weldability of steels.

V-Notch Slow-Bend Test: The possibility of using Chary impact specimens with properly machined notches located at the point of maximum hardness in the parent metal appeared to be a good means of determining weldability. As is shown in Fig. 3, specimens of this type have been tried. All in all, good agreement among impact values and other weldability results has been found. However, the usual criticisms of the impact specimen are likely to be brought up once more as the test ordinarily shows a scatter of results because of the inability of machinists to make every notch the exact duplicate of every other notch.

The V-notch slow-bend test uses the specimen of Fig. 3 in the standard Navy qualification test jig. The specimen is inserted in the jig with the notch in tension, and pressure is applied until the point of maximum load is passed and the specimen fails. As in the T-bend test, there is fine agreement among the results from maximum load at failure and weldability.

Hess Tensile-Ductility Test: In Fig. 4 is shown a new test proposed by Dr. W. F. Hess which might well be called a tensile-ductility test for weldability. The Hess test is unique in several respects. First, it determines ductility in a tensile test; second, tests are made parallel to and transverse to the weld; and third, specimens are tested in both the as-welded and the stress-relieved conditions.

Most tests for weldability depend for their results upon a single flat bead or a single fillet bead. Other tests using multiple beads explain (and rightly so for their purposes) that since the first bead has the most severe influence on weldability, it makes the use of a single-bead weld reasonable. But few single bead welds are used in important structures of any size. Therefore the Hess test employs a multiple pass weld and takes into account residual stresses induced during the welding operation.

Three specimens, A, B and C, make up a complete set for the Hess tensile-ductility investigation. Specimen A is stress relieved before being pulled. This serves to show up any cracks that were formed during welding because such cracks will persist through the heat treatment. Thus the sensitivity of the steel and the welding process as regards crack formation may be observed.

Some welded structures are designed to be used in the as-welded state. Specimen B may be used to discover whether or not the combination of welding procedure and parent metal is such as to lead to crack-free tensile tests in the as-welded condition. If the specimen fails without showing any transverse cracks, the suitability of process may thus be demonstrated.

And finally, through the behavior of specimen C, the overall properties of the welded joint may be evaluated. For if the weld metal is less strong than the parent plate, failure might be expected in the weld of specimen C even though specimens A and B may have come through the test with flying colors.

Local elongation points on the various specimens are used to study the elongation of the specimens. The data from the stress-relieved and as-welded coupons may be compared

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Due to curtailed production of automobiles and trucks, the facilities of the American Metal Products Company are available, for immediate volume production, on a sub-contract or co-contract basis, on any or all of the items listed at the right.

American Metal Products Company has been producing these and similar items for the automobile, truck and allied industries for the last 24 years. During this period we have grown and expanded to the point where we now occupy nearly 5 acres in an ultra-modern, up-to-date plant.

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For further details as to how our facilities and manpower may best fit into your future production requirements write, wire or phone.

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★ WELDED STEEL TUBES AND TUBING in diameters from ¾" to 5" and in gauges up to ¼".

★ FABRICATED STEEL TUBULAR PARTS AND WELDED ASSEMBLIES.

★ LARGE AND SMALL STEEL STAMPINGS.

★ FORGED AND UPSET PARTS FROM 2", 3", 4", 5" upsetters.

while that for specimen C will reveal the varying elongations that are found in weld metal, heat-affected base metal and unaffected base steel. Surely the Hess test is a versatile procedure for determining the quality of weldability as observed in multiple-pass butt welds.

Because the matter of weldability is so intimately connected with many welding problems common to armaments, many methods of attack have been developed. Lately a growing realization of the supreme importance of tests that measure ductility has brought the bead-bend test, the T-bend test and the V-notch slow-bend test to the fore for single bead methods of investigating weldability. Where multiple-pass welds must be studied, the Hess tensile ductility test has been a fine contribution to the testing methods at our command.

Iron Powder

(*Continued from Page* 88)

Ore with which experiments have been conducted is from the Ford property near Iron Mountain, Mich., and is a low-grade specular hematite, running from 20 to 40 per cent iron. It has not proved economical to transport this material to the Ford plant for smelting in blast furnaces, and as a result the Iron Mountain community has languished. Should it be possible to initiate reduction of this ore by the new process, for later use either as iron powder for fabricated parts or for remelting and purifying, the impetus to Mr. Ford's ore community would be tremendous. Ample water power is available near the ore, suggesting the possibility of establishing a reduction plant in the Upper Michigan area.

The reduction method evolved by Mr. Boyer and his staff can be summarized as follows: The ore is given a preliminary roast and then ground. Next it is dissolved in either hydrochloric or sulphuric acid to produce either ferric chloride or sulphate. Following through with the chloride, it is reacted with more ore to produce ferrous chloride and the latter broken down by electrolysis into pure iron and ferric chloride, the latter being returned to the system and thereby permitting practically a closed reduction system.

In the laboratory apparatus, a screw elevates the fine ore while a counter-current of reagent passes over it. The reacted liquid then is piped to an electrolytic tank and thence back to the top of the screw conveyor. Pure iron is plated out of the solution on a cathode which is simply a steel plate. As the deposit builds up on the plate, it can be stripped off in sheet form. Containing a substantial amount of hydrogen, the iron deposit is brittle and can be pulverized readily for use as a powder. However, by driving off the hydrogen with heat, the deposit is made ductile and can be used in sheet form. The latter material is ideal for use as magnet cores because of its low magnetic retentivity. Cores for distributor coils made of this material have shown good qualities in laboratory tests.

The electrolytic phase of the reduction is estimated to require about 1 kilowatt of power per pound of iron deposit—an economical operation, particularly where low-cost power is available. This suggests the tie-in with the ore and water power readily obtained at the Ford properties in Upper Michigan.

Electrolytic iron powder has been found by many experimenters to be ideal for compressing and sintering into usable parts. The work of Amplex Division of Chrysler Corp. and the Moraine Products Division of General Motors Corp. in this respect is familiar to many. The Ford oil pump gear, produced from iron powder to which 3 to 8 per cent of copper has been added can be made to close tolerances and ap-

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pears to be entirely free from corrosion, although corrosion is no problem once the gear is placed in service.

Carbon content is low, around 0.02 to 0.05 per cent. No alloying elements are added other than the copper which is diffused into the iron compact during sintering.

The gear has been molded in a single-cavity die on a hydraulic press at the rate of 30 pieces per minute, using a pressure of about 50 tons per square inch. Sintering is done in an electric controlled-atmosphere furnace. Growth during sintering is limited to about 0.001-inch at the most. Careful control of atmosphere and sintering temperature, as well as density of the original iron powder, can restrict any change in mass of the part.

Precision Plating

(*Continued from Page* 80)

insure good adhesion when subjected to the soldering temperatures. Following the soldering operations, the work is cleaned, given a copper flash deposit and then given an additional nickel plate 0.0002-inch thick.

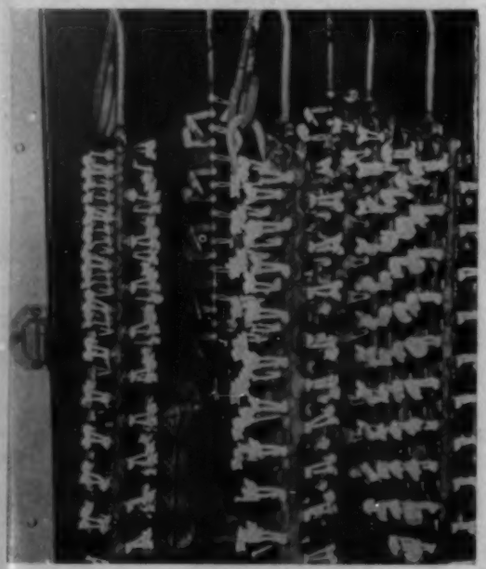
When brass is the basis metal, it is soft soldered directly and then plated by coating with 0.0004-inch of cadmium, a minimum thickness of 0.0005-inch of copper and nickel, or a total of 0.0006-inch consisting of 0.0002-inch copper, 0.0002-inch nickel and 0.0002-inch silver. Because of its low coefficient of expansion, some Invar metal is used on units which in service may be subjected to great variations in temperature. Operations preceding the electroplating of the condensers deserve careful consideration.

Racking: Proper racks were designed and constructed to handle each particular part. This is necessary because it is essential to secure uniform deposition on each item on the rack. Poor arrangement of the work on the racks would, in many instances, cause a variation of thickness on the individual part. Of equal importance is the necessity of having the racks coated with an insulating material.

This material should be easy to apply, should provide an impervious coating, should not crack or peel when subjected to hot acids and alkalies, and should be able to withstand the normal abuse they would be subjected to. The obvious reason for the insulated coating is to prevent deposition on the rack itself which would, if it were not coated, throw out all electrochemical calculations to secure the specified thickness of the electrodeposit.

Cleaning, of course, is of primary importance. In the cleaning of various metals and alloys, the selection

Fig. 5—Drying of the work in ovens is the last step in the controlled sequence of operation. Work is first passed through a hot water rinse before entering the drying oven. Illustrations furnished by Hammerlund Mfg. Co., New York



Bofors 40 m m. anti-aircraft gun has parts made of Ampco Metal.

Bronze Sub-contractor to the War Industries

In anti-aircraft gun carriages — in varied types of ordnance — Ampco Metal, an alloy of the aluminum bronze class, and Ampco-made bronzes are used because of their excellent bearing characteristics and ability to withstand high stresses.

The Ampco foundries are furnishing bronze parts for aircraft, ordnance, machine tools and other essential war industries.

Where parts are needed that must "take it"—give unusual service under severe operating conditions, Ampco bronzes can be selected with assurance that they will give several times the life of ordinary materials.

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AMPCO LITERATURE Available

AMPCO METAL, catalogue 22
Ampcoloy—Industrial Bronzes Catalogue
Ampco-Trode Coated Aluminum Bronze Welding Rod
Ampco Metal in Machine Tools
Ampco Metal in Bushings and Bearings
Ampco Metal in Dies
Ampco Metal in Acid-Resistant Service
Ampco Metal in Aircraft
Ampco Metal Centrifugal Castings
Ampco Metal in Heavy Machinery
Ampco Metal in Gears

Government contractors, needing a reliable source of bronzes, are invited to submit their requirements to our engineers. Bronze specifications to government requirement are readily met at Ampco.

Literature covering applications and uses of Ampco Metal are listed at left. Sent free on request.

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AMPCO METAL
The Metal Without An Equal

of the proper alkaline compounds for soaking and electrocleaning for each type of metal or alloy is important. For instance, in cleaning aluminum and its alloys, the cleaning compound should not attack or etch the metal in any way and yet it must have the ability to remove all types of oils and grease.

Acid Dipping: It is not within the scope of this article to describe the bright dips and scaling dips used in a plant of this kind. The various bright dips and other acid solutions are made up to remove the oxides and scale satisfactorily and to treat the surfaces as required.

Electroplating: As in all modern electroplating departments, emphasis is placed on keeping the electroplating solution standardized by periodic chemical analysis. Filtering of the electrolyte is carried out when deemed necessary.

The tanks are made of welded steel with or without rubber lining. In the instances where no rubber lining is used, glass lining is advisable in order to prevent stray currents in the plating tank which would upset the calculations based on the time and current densities to secure the desired thickness of deposit.

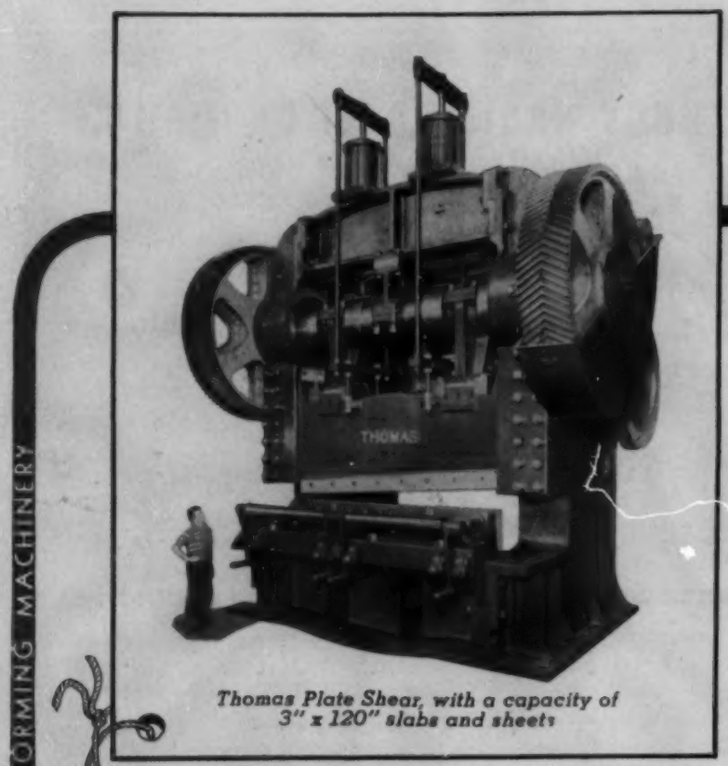
Wherever necessary, heating coils with thermostatically controlled devices are installed to keep the solutions at a constant temperature to maintain the maximum cathode efficiency. Because of the design of the parts, agitation of the solution by mechanical means is often necessary to avoid cathode polarization and to further induce even distribution of the deposits.

It is essential to have first class rheostats and meters to adjust the current density accurately. Electrical timing devices are also important items of equipment so that the operator may be sure the racks have been plated a sufficient length of time as specified by calculations previously worked out.

Drying: Following the plating operations, the work is thoroughly rinsed in clean running water, given a hot-water rinse and then placed in drying ovens. After it has been thoroughly dried, the work is carefully unracked and placed in suitable trays so there is little chance of damaging or scratching the work when transferring it to the assembly departments.

There are several methods of testing the thickness of these electrodeposits. As previously stated, resistance to corrosion is a determining factor in deciding the thickness of deposit so one of the most common tests is for corrosion resistance. A small salt-spray-testing unit is recommended as it provides a check for the electroplating foreman that assures him that his work is meeting the specifications regarding corrosion.

Not only in the case of radio equipment but also in the manufacture of many other ordnance items the requirements of serviceability and accuracy have given the electroplater an important role in the war production effort. Platers have been frequently called upon to meet the most exacting electroplating tasks. The excellent manner in which they have met such demands has been due to a combination of good equipment, good materials, good working personnel and competent supervision.



Thomas Plate Shear, with a capacity of 3" x 120" slabs and sheets

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THIS is one of many such units, developed by Thomas for shearing aluminum and other vital present-day metals. It is typical of Thomas' ability to design and build equipment for metal-forming or fabricating requirements.

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FABRICATING MACHINERY

Cuts Handling Time

(*Concluded from Page 82*)

with its load runs inside the building.

Fig. 2 shows operator positioning sheets for stacking. As sheets can be stacked almost to height of the crane bridge, much greater storage is possible in a given area than by means of hand stacking. The neat bundles are also more easily inventoried. Reduction in losses due to scratched or damaged sheets has been noteworthy.

WPB Bulletin Aids Ohio Manufacturers

A procurement bulletin, purpose of which is to acquaint manufacturers with general descriptions of war materials needed was recently issued by the Ohio Contract Distribution Branch of the Production Division, War Production Board, East Ninth and Chester, Cleveland. It contains information required regarding government contracts awarded.

According to the government bulletin, detailed information concerning its contents must be obtained by a personal call at the Cleveland office or any one of the Ohio branch offices which are located in Canton, Cincinnati, Columbus, Dayton, Toledo and Youngstown.

New Product Eliminates Cleaning Operation

Nickel alloys can now be drawn, stamped or formed and then annealed without cleaning by using a dispersion of Diglycol Stearate S in water according to Glyco Products Co. Inc., 230 King street, Brooklyn, N. Y.

The dispersible product is a white, wax-like solid that has a melting point of 51 to 54 degrees Cent. It will fire off completely at any annealing temperature in an atmosphere of oxygen or hydrogen.

For drawing or stamping, usually a 1 per cent concentration, sprayed, is sufficient as a lubricant, according to the company.

Terror-Stricken Moths Flee from Felt Washers

Moths, those long-time foes of woolens who also have an appetite for felt washers now are in for an unpalatable time.

Research engineers at Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., to eliminate the subversive activities of these creatures in connection with power equipment, recently developed a liquid insecticide treatment for felt washers that is creating consternation in the moth world.

Prepares Metal Surfaces for Painting

A new cleaning solution, called Ruscat, for preparing metal surfaces before the application of corrosion-resistant paints and coatings and also for preventing further rust formation is announced by United States Stoneware Co., Akron, O. It is said to produce a mild etch over metal surfaces resulting in a chemically adherent inorganic base over which the lacquers and coatings are made to gain their maximum adhesion. Method of application is either by brushing or dipping.

New Dynamite Cartridge Concentrates Charge

A new dynamite cartridge, called Tamptite, which expands under tamping to fill the bore hole and concentrates the charge has been developed by its explosives department according to Hercules Powder Co., Wilmington, Del. It is said to eliminate necessity of slitting cartridges, and permits concentration of a charge within the hole with little or no spillage of powder.

Dynamite in the cartridge is packed in a waxed paper shell having a line of perforations spiraled around the dynamite stick. Line of perforations is located between inner and outer layers of paper so that there is no direct track through which moisture might enter or ingredients leak out.

When tamped in a bore hole, the cartridge does not open but unwraps slightly as the cartridge expands.

...WITH A PIECE OF CHALK

Frequently a minor and simple change in weld design may be all that is necessary to overcome a difficulty. Murex engineers have frequently worked out such changes on the spot—saving the manufacturer many valuable hours of productive time.

In one instance a new weld design helped a road machinery manufacturer overcome weld failures where cold rolled pins were joined to bearing plates. Investigation showed that only about 70% penetration was being obtained. The new design called for a 45° bevel of the bearing plate instead of 60° and the machining of a U groove in the pin which previously had been neither beveled nor grooved.

The result was full penetration and elimination of the failures.

The Murex engineering staff is at the service of all companies with war contracts to help them speed up production and improve welding procedure. It is not necessary to be a Murex electrode user to receive this service.

Specialists in welding for nearly 40 years. Manufacturers of Murex Electrodes for arc welding and of Thermit for repair and fabrication of heavy parts.

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Data Sheet Provides Maintenance "Tips"

Timely and of special interest to plant maintenance superintendents and safety engineers is a special 5-page "Digest" recently compiled by Oakite Products Inc., 22 Thames street, New York. It reviews materials, methods and procedures successfully used for handling effectively 28 essential, commonly recurring equipment maintenance and plant sanitation jobs in factories and mills.

Set up in data sheet form, the publication provides many ideas and suggestions for speeding certain jobs, conserving man hours, increasing mantenanice efficiency, improving plant safety, shortening "down time" for equipment and getting it back into service quickly. It also discusses many different types of maintenance work. Copies of the publication are available upon request from the company.

Electrons Reveal Structure of Metals

A new microscope which uses electrons instead of light to form magnified images of minute objects is now revealing secrets of important metal alloys in the hands of research men at General Electric Co., Schenectady, N. Y. It is enabling science to find out just what happens when metals harden.

According to Dr. David Harker of the company who recently described the microscope before a meeting of the American Institute of Electrical Engineers, details that are too small to affect light waves do change the paths of electrons, and produce an image. The magnifying power of the electron instrument is as much as 100,000 diameters, or 50 times that of the older type, he declared.

Dr. Harker said that one of his first results was a determination of the structure of martensite. He found that martensite consists of alternate plates of iron and iron carbide, these plates each being about 100 atoms thick.

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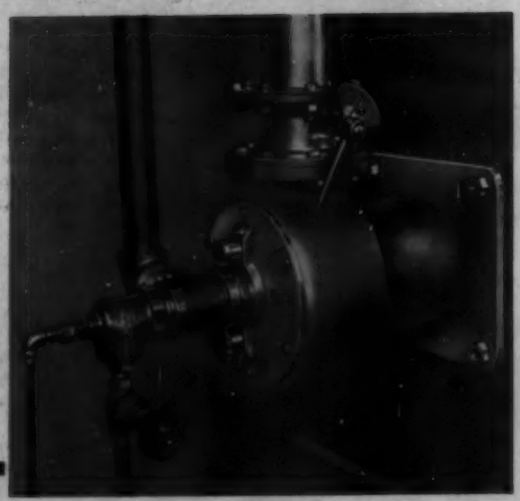

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Issues New Manual on Spring Engineering

All types of springs are covered in a new 132-page manual, *Manual of Spring Engineering*, recently issued by American Steel & Wire Co., Rockefeller building, Cleveland. It describes spring materials, fatigue characteristics, temperature effects, static and dynamic loads, tolerances, deflections, stresses, working space, design factors and other subjects.

Copies may be obtained by application on a business letterhead to the sales promotion department.

Announces Electrodes For Welding Armor

Harnischfeger Corp., Milwaukee, announces three new electrodes—AW-1 AW-2 and AW-3—developed specifically for welding armored vehicles according to Army Ordnance Department specifications AXS-492 and AXS-497.

Details concerning the electrodes and their application pertaining to armor welding are restricted to prime and sub-contractors qualifying under ordnance regulations. Also they are available only on application through the company's field representatives.

Film Holder Simplifies X-Raying of Castings

St. John X-Ray Service Inc., 30 Thomson avenue, Long Island, N. Y., announces the development of a new film exposure holder which is said to greatly simplify the technique, and improve the results when X-raying aluminum and magnesium castings. In addition it also is offering a new cassette developed for work with million-volt X-ray apparatus.

Industrial Equipment

(*Continued from Page* 100)

taps of different numbers of flutes. A manual type diamond dresser also is included for the chamfering wheel. The spiral pointing unit to the right of unit employs a saucer type wheel. Its fixture accommodates taps from the smallest machine screw to ½-inch diameter, and taps of 2, 3 or 4 flutes can be

handled. Correct depth and hook desired in pointing is obtained by manual vertical and horizontal feed adjustments. A safety stop limits the angular swing of the unit. The separate polishing unit for spiral points, etc., located on top of the machine base, is operated by a separate motor and is fitted with a cone-shaped wheel. The machine also has storage space in the base for collets, grinding wheels, tools, etc.

Grinding Machines

Fitchburg Grinding Machine Corp., Fitchburg, Mass., has placed on the market multiple precision grinders incorporating standard bowgage independent, self-contained wheelhead units, mounted on special bases to suit various work. These double and triple head machines are adapted for spot grinding gun barrels and long spindles that require backrests in subsequent turning operations. Rough forgings, previously centered may be ground directly from rough or rolled stock. A single push button on each machine controls the cycle of all the bowgage heads except in the case of rough forgings when it sometimes is necessary to feed the wheelheads in by hand until contact is made. The bowgage heads are mounted on ways so that they may be located longitudinally in different positions. This allows spot grinding to be performed on a variety of gun barrels or spindles.

Gas Recorder

Mine Safety Appliances Co., Braddock street, Pittsburgh, is offering a new continuous carbon monoxide recorder to provide extremely precise measurement and recording of very low concentrations of carbon monoxide in air. It consists of a dryer, analyzer and potentiometer recorder. A refinement of the original instrument, it has many applications in continuous testing of atmospheres and gases for carbon monoxide. Its range and sensitivity can be varied to suit conditions and results desired. Where sentivity is of prime importance, calibration covers a range of from 0 to 500 parts per million. Where a wider range is desired, the instrument can be calibrated to cover a range of from 0 to 2000 or more parts per million. The dryer consists of two towers of activated alumina so connected that while one is drying the air sample passing to the analyzer, the other is simultaneously being reactivated. Reactivation is accomplished by passing exhaust air from the ana-

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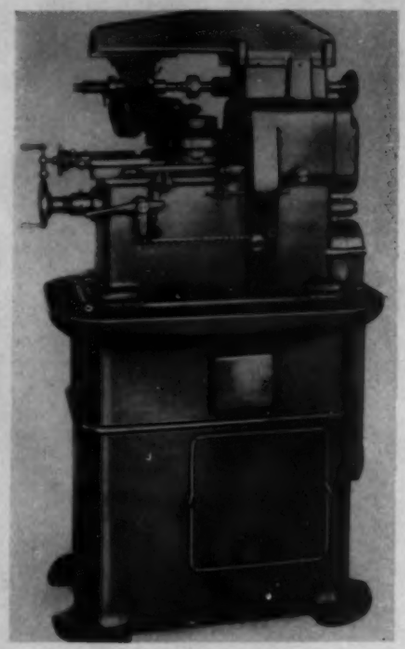
DIAMOND G LOCKWASHERS

lyzer cell through the spent tower and simultaneously heating the tower by means of internal electrical heaters. The motor and pump for drawing the sample and forcing it through the analyzer is mounted on the bench in front of the analyzer panel. The pump is driven by a ¼-horsepower motor, which operates on either 110 or 220 volts alternating or direct current.

Gear Hobber

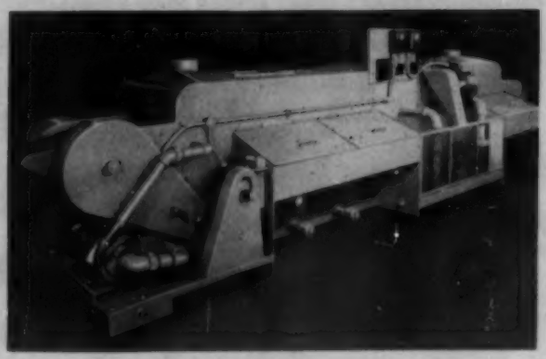
Triplex Machine Tool Co., 125 Barclay street, New York, has placed on the market a new model No. 1 American micron spur and spiral gear hobber designed to generate accurate spur and spiral pinions and gears, right hand or left hand, up to 6-inch diameter and maximum DP 12. A Hamilton Tool built machine, it obtains its accuracy by using the hobbing method of generating the tooth profile. The hob spindle is mounted in the headstock equipped with a swivel base that can be set to the proper helix angle. The whole spindle assembly is mounted on the carriage which performs the automatic longitudinal feed. Length of automatic traverse of the carriage is 5 inches. A lead screw in the base actuates the power feed. It is driven by the work rotating spindle through four feed change gears. Nine feeds ranging from 0.002 to 0.33-inch per revolution of the work are available through the use of the standard set of feed change gears. The hob is brought into cutting position by elevating the swivel base of the headstock. Rotation of the work spindle is provided by a train of gears from the main drive shaft over index change gears in the rear of the machine and through a differential on the left hand side of the machine. Standard equipment of the machine includes a set of three change gears for one definite number of teeth on the workpiece. Any number of teeth between 6 and 130 can be hobbed. Also any even number of teeth between 130 and 260. Between 260 and 325 the number of teeth must be divisible by 5. The differential mechanism of the unit is used only when hobbing spiral teeth. A 1-horsepower motor, mounted inside the pedestal, furnishes the power through a 2-step belt drive.



Repair Truck

Service Caster & Truck Co., 640 North Brownswood avenue, Albion, Mich., is offering a new type utility or repair truck which also is suitable as a portable work table or parts truck. Constructed of steel, with the exception of the top, which is made up of 1¾ x 1¾-inch maple planking, glued and bolted together, it is equipped with 12 drawers, plus two roomy compartments on one side. A panel pulls out and down over the drawers for locking. The other side has one large compartment divided by a shelf, sliding doors being embodied for enclosing

when the big guns bark



RANSOHOFF EQUIPMENT

has played its part....

RANSOHOFF Equipment is now operating in many plants cleaning projectiles of all sizes. The unit illustrated washes, rinses, and rust proofs 75 mm. projectiles, faster and better; saves valuable man hours, increases production and reduces costs.

Don't let your cleaning equipment be the "bottleneck" that slows up your production.

Consult RANSOHOFF Engineers; have them streamline your cleaning processes with RANSOHOFF Equipment. Designed to meet your specific requirements, from a survey made under actual working conditions.

RANSOHOFF-cleaned, metal products, means better final finishing and fewer rejects.

Write or wire Dept. "S" for further details.

N. RANSOHOFF, Inc.

TOWNSHIP AND BIG FOUR R. R. CINCINNATI, OHIO

contents. The truck is 60 inches long, 30 inches wide and stands 42½ inches from the floor. Its running

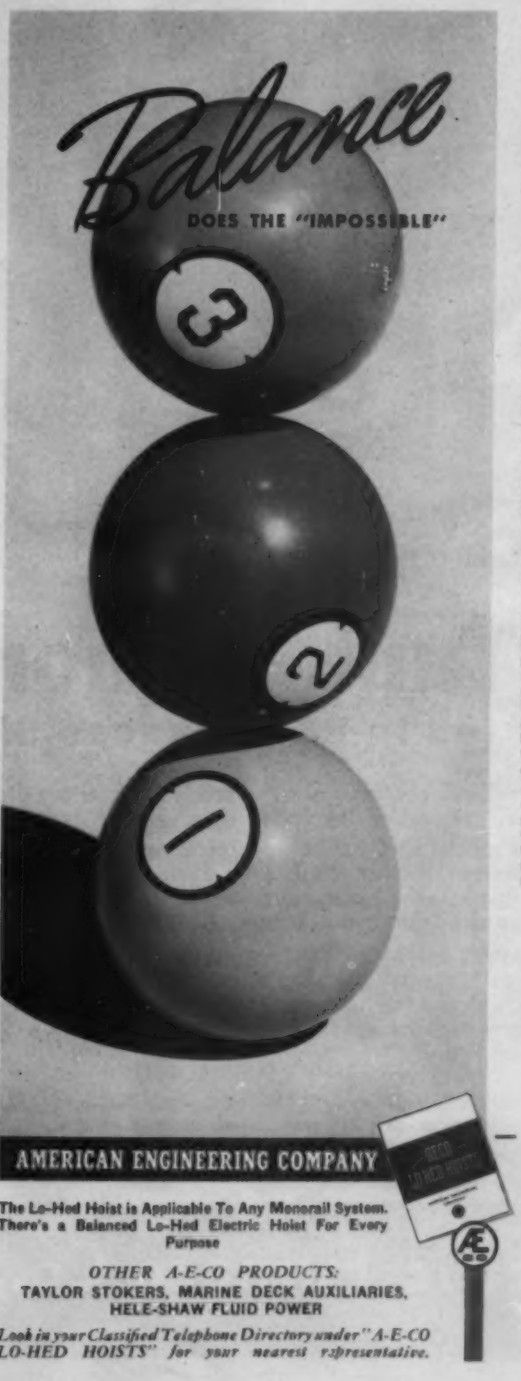
gear consists of two 8-inch swivel casters at the rear. The swivels are equipped with lock and brake.

Capacitor Weld Unit

Weltronic Corp., 3080 East Outer drive, Detroit, has developed a Revers-O-Charge capacitor weld unit to meet the increasing demand for power and control units for capacitor-discharge welding, particularly in welding of aluminum for aircraft. The new unit assures high power factor with balanced 3-phase load and minimum peak kilovolt-ampere demand. It is designed for operation on 230/460 volts, 3-phase and is available for either 60 or 50 cycle. A voltage regulator dial mounted near the center of the dead-front panel permits controlling the charge of condensers to the voltage desired. Exact number of condensers to be charged can be selected by two 6-point tap switches on the panel. These are enclosed by a hinged cover interlocked with the electrical system so that setting of tap switches cannot be changed without automatically discharging the condenser bank through a short-circuiting mechanism. At the bottom of the panel is an 8-point switch which permits selection of any one of eight different charging rates to suit the characteristics of the operation.

Hydraulic Control Unit

Road Machinery Division, Gar Wood Industries Inc., 9724 Riopelle street, Detroit, announces a new type hydraulic control unit for operating heavy-duty dirt-moving machinery drawn by industrial track-type tractors. It converts mechanical power from the tractor motor to flexible hydraulic power for transmission to the hydraulic jacks on earth-moving scrapers, road builders, bulldozers and rippers. Power is taken from the tractor motor through a direct shaft connection to the pump.

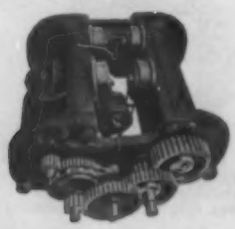


BALANCE did the "impossible" in this electric hoist

Until the invention of the Lo-hed electric hoist, drawing the hook block up close to the beam was considered impossible. See how the Lo-Hed hoist overcomes this problem. Motor and drum are on opposite sides of the supporting beam. This balanced arrangement allows the hook to be pulled up between motor and drum—until it almost touches the beam, giving you minimum headroom—a desirable plus feature for which you pay no premium. This same arrangement makes possible the use of an all spur gear drive from motor to drum.

Besides these benefits the Lo-Hed hoist has every desirable feature you want in an electric hoist . . . heavy duty hoist motor, ball or roller bearings, automatic holding brake, 100% positive automatic stop when load reaches its upper limit, gearing sealed in an oil bath, a controller proof against fire, dust and moisture, easily removable covers and many others.

The Lo-Hed hoist is built to stand up three shifts a day, 7 days a week—the kind of a hoist you need now. The Lo-Hed you buy today will be going strong long after the war has ended . . . and you want that kind of a hoist too. Send for our catalog today.



AMERICAN ENGINEERING COMPANY

The Lo-Hed Hoist is Applicable To Any Monorail System. There's a Balanced Lo-Hed Electric Hoist For Every Purpose

OTHER A-E-CO PRODUCTS:
TAYLOR STOKERS, MARINE DECK AUXILIARIES, HELE-SHAW FLUID POWER

Look in your Classified Telephone Directory under "A-E-CO LO-HED HOISTS" for your nearest representative.

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☐ Please send me your complete catalog of LO-HED HOISTS.
☐ Ask your representative to get in touch with me promptly.

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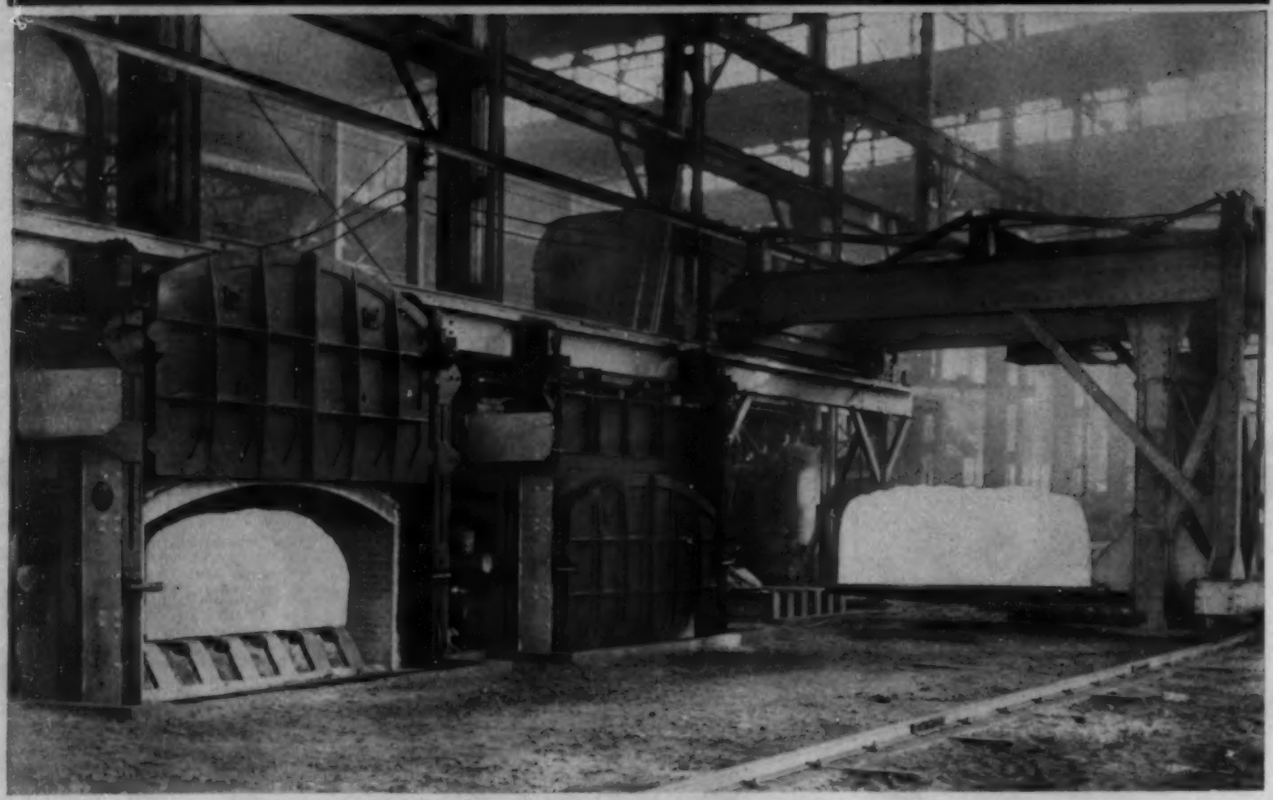
(Please print plainly)

EF FURNACES

For Every Industrial Heat Treating Process



Heavy Tank Armor Castings

are Heat Treated in EF Furnaces Similar to the Above

Extra large castings and other products of various dimensions and weights are handled in EF furnaces of the above type.

The special gantry type crane picks up the entire load, deposits it in the furnace and withdraws. After the heating cycle is completed, the crane quickly removes the charge from the furnace to the oil or water quench or directly to the unloading platform depending on the treatment required.

Another recent oil fired layout consists of nine similar furnaces. One 14,000 lb. capacity special EF gantry crane serves the entire battery. These furnaces are arranged for high and low temperature operations ranging from 750°F. to 2000°F. The higher temperature furnaces have capacity for heating a 10,000 lb. charge to 2,000°F. in three hours.

ELECTRIC EF FURNACES FUEL FIRED

We specialize in building Production Furnaces — Oil Fired, Gas Fired and Electric.

Other outstanding EF production installations include furnaces for heat treating shell forgings, cartridge cases, bomb and gun parts, machine gun cartridge clips, aircraft and aircraft engine parts and many other allied products.

The Electric Furnace Co., Salem, Ohio

Gas Fired, Oil Fired and Electric Furnaces---For Any Process, Product or Production

Steel Industry Sets New High Records

Iron ore season has earliest opening in history. Better scrap supply eases tension. Bar mills crowded by shell requirements

MARKET IN TABLOID ★

Demand
High ratings crowd mills.

Prices
Slight adjustments in scrap.

Production
Increased ½-point to 98 per cent.

NEW production records in pig iron and steel and opening of the iron ore season at the earliest date ever known forecast probably the greatest activity ever attained by the steel industry.

Numerous steelmakers established new high marks in March, among other accomplishments being a daily and monthly blast furnace production figure by a Michigan stack, claimed as a new world record. The increasing tempo was well under way when the War Production Board asked acceleration and will provide excellent reports as of April 1, when first production figures are asked. That the records were made in the face of scrap shortages makes them the more impressive. Various factors promise further increase as new equipment and methods now under way produce results.

Opening of the iron ore shipping season 12 days earlier than the record set last year indicates the effort to bring down the expected 5,000,000 tons or more above the record total of 1941. In March 792,558 tons were loaded at upper lake ports, the first cargo of about 10,000 tons reaching a Cleveland dock March 28. Last year the first arrival was April 9, then a new record. Most of the ore fleet now is in service.

While plate demand leads all steel products, shipbuilding contributing most, bars are becoming almost as important. Requirement for shells are a large factor and allocations are being made to cover needs of the Army and Navy. One lot of 11,000 tons was distributed recently for delivery to shellmakers in the East and other tonnages are about to be provided for the Middle West. This heavy demand for munitions manufacture has crowded other bar users severely and agricultural implement manufacturers have been forced to curtail some of their lines. Alloy grades of bars are in greatest demand and top priorities are applied to most of the tonnage.

Steel production last week edged upward ½-point to 98 per cent, the same rate as prevailed a year ago, though the larger capacity now available means greater tonnage than a year ago. Pittsburgh advanced ½-point to 96½ per cent; Chicago ½-point to 104½, equal to its all-time record of December; Cleveland gained 1 point to 90½ per cent and St. Louis 4 points to 87 per cent. Detroit receded 5 points to 88 per cent. Unchanged rates were held at other points: Birmingham 95, Cincinnati 92, Wheeling 82½, New England 80, Buffalo 93, Eastern Pennsylvania 90 and Youngstown 94.

Some relief in the beehive coke situation is expected from reopening of a large coking coal operation in the Connellsville region and rehabilitation of about 500 ovens to process the coal. By-product coke oven expansion is proceeding faster than the program asked by WPB.

Scrap supply holds the improvement of the past fortnight and steelmaking equipment returned to service recently after idleness for its lack continues in service. Effect of the various organized campaigns to search out and move dormant scrap is more apparent and tonnage in the aggregate is large enough to have a decided effect. Some allocations still are necessary to assure good distribution and melters whose stocks have been depleted have asked assistance in some instances. Weather conditions have had much to do with freer movement and indications are the shortage will not reappear before next winter.

Office of Price Administration has amended regulations on scrap without changing prices on standard grades. The changes related principally to special grades and differentials. Cast iron borings for chemical use are placed on a uniform $5 premium instead of $3 and $5 previously. High-manganese steel takes a premium of $7 over heavy melting steel to conserve manganese. Several railroad grades for special purposes are placed on a premium basis to prevent their misuse. The changes are designed to provide relief to certain classes of consumers who formerly found difficulty in obtaining their requirements.

Office of Price Administration having made no changes in prices affecting price composites, they remain at the level of several weeks: Finished steel $56.73; semifinished steel $36.00; steelmaking pig iron $23.05; steelmaking scrap $19.17.

COMPOSITE MARKET AVERAGES

	Apr. 4	Mar. 28	Mar. 21	One Month Ago Mar., 1942	Three Months Ago Jan., 1942	One Year Ago Apr., 1941	Five Years Ago Apr., 1937
Finished Steel	$56.73	$56.73	$56.73	$56.73	$56.73	$56.73	$61.95
Semifinished Steel	36.00	36.00	36.00	36.00	36.00	36.00	40.00
Steelmaking Pig Iron	23.05	23.05	23.05	23.05	23.05	23.05	22.84
Steelmaking Scrap	19.17	19.17	19.17	19.17	19.17	19.17	21.27

Finished Steel Composite:—Average of industry-wide prices on sheets, strip, bars, plates, shapes, wire, nails ,tin plate, standard and line pipe. Semifinished Steel Composite:—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. Steelmaking Pig Iron Composite:—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. Steelworks Scrap Composite:—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished Material

	Apr. 4, 1942	Mar. 1942	Jan. 1942	Apr. 1941
Steel bars, Pittsburgh	2.15c	2.15c	2.15c	2.15c
Steel bars, Chicago	2.15	2.15	2.15	2.15
Steel bars, Philadelphia	2.47	2.48	2.47	2.47
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.215	2.217	2.215	2.215
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.10	2.10	2.10	2.10
Plates, Philadelphia	2.15	2.215	2.15	2.21
Plates, Chicago	2.10	2.10	2.10	2.10
Sheets, hot-rolled, Pittsburgh	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.50	3.50	3.50	3.50
Sheets, hot-rolled, Gary	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Gary	3.50	3.50	3.50	3.50
Bright bess., basic wire, Pitts.	2.60	2.60	2.60	2.60
Tin plate, per base box, Pitts.	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.55	2.55	2.55	2.55

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$34.00	$34.00	$34.00	$34.00
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	34.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	34.00
Wire rods No. 5 to ⅜-inch, Pitts.	2.00	2.00	2.00	2.00

Pig Iron

	Apr. 4, 1942	Mar. 1942	Jan. 1942	Apr. 1941
Bessemer, del. Pittsburgh	$25.34	$25.34	$25.34	$25.34
Basic, Valley	23.50	23.50	23.50	23.50
Basic, eastern, del. Philadelphia	25.34	25.365	25.34	25.34
No. 2 fdry., del. Pgh., N.&S. Sides	24.69	24.69	24.69	24.69
No. 2 foundry, Chicago	24.00	24.22	24.22	24.22
Southern No. 2, Birmingham	20.38	20.38	20.38	20.38
Southern No. 2, del. Cincinnati	24.06	24.06	24.06	24.06
No. 2X, del. Phila. (differ. av.)	26.215	26.24	26.215	26.215
Malleable, Valley	24.00	24.00	24.00	24.00
Malleable, Chicago	24.00	24.00	24.00	24.00
Lake Sup., charcoal, del. Chicago	31.54	31.44	31.34	30.34
Gray forge, del. Pittsburgh	24.19	24.19	24.19	24.19
Ferromanganese, del. Pittsburgh	125.63	125.39	125.33	125.33

Scrap

Heavy melting steel, Pitts.	$20.00	$20.00	$20.00	$20.20
Heavy melt. steel, No. 2, E. Pa.	18.75	18.75	18.75	18.00
Heavy melting steel, Chicago	18.75	18.75	18.75	18.80
Rails for rolling, Chicago	22.25	22.25	22.25	22.65
No. 1 cast, Chicago	20.00	20.00	20.00	22.31

Coke

Connellsville, furnace, ovens	$6.25	$6.25	$6.25	$5.50
Connellsville, foundry, ovens	7.25	7.25	7.25	6.00
Chicago, by-product fdry., del.	12.25	12.25	12.25	11.85

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Following are maximum prices established by OPA Schedule No. 6 issued April 16, 1941, revised June 20, 1941 and Feb. 4, 1942. The schedule covers all iron or steel ingots, all semifinished iron or steel products, all finished hot-rolled, cold-rolled iron or steel products and any iron or steel product which is further finished by galvanizing, plating, coating, drawing, extruding, etc., although only principal established basing points for selected products are named specifically. All seconds and off-grade products also are covered. Exceptions applying to invididual companies are noted in the table.

Semifinished Steel

Gross ton basis except wire rods, skelp

Carbon Steel Ingots: F.o.b. mill base, rerolling qual., stand. analysis, $31.00

(Empire Sheet & Tin Plate Co., Mansfield, O., may quote carbon steel ingots at $33 gross ton, f.o.b. mill.)

Alloy Steel Ingots: Pittsburgh base, uncropped, $45.00.

Rerolling Billets, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $34.00; Detroit, del. $36.00; Duluth (bil.) $36.00.

(Wheeling Steel Corp. allocated 21,000 tons 2" square, base grade rerolling billets under lease-lend during first quarter 1942 at $37, f.o.b. Portsmouth, O.; Andrews Steel Co. may quote carbon steel slabs $41 gross ton at established basing points.)

Forging Quality Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $40.00; Detroit, del. $42.00; Duluth, $42.00.

(Andrews Steel Co. may quote carbon forging billets $50 gross ton at established basing points.)

Open Hearth Shell Steel: Pittsburgh, Chicago, base 1000 tons one size and section: 3-12 in., $52.00; 12-18 in., $54.00; 18 in. and over, $56.00.

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $54.00.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $34.00.

(Empire Sheet & Tin Plate Co., Mansfield, O., may quote carbon steel sheet bars at $39 gross ton, f.o.b. mill.)

Skelp: Pittsburgh, Chicago, Sparrows Pt., Youngstown, Coatesville, lb., $1.90.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, No. 5—9/32 in., inclusive, per 100 lbs., $2.00.

Do., over 9/32—47/64-in., incl., $2.15. Worcester add $0.10 Galveston, $0.25. Pacific Coast $0.50 on water shipment.

Bars

Hot-Rolled Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, base 20 tons one size, 2.15c; Duluth, base 2.25c; Detroit, del. 2.25c; New York del. 2.51c; Phila. del. 2.49c; Gulf Ports, dock 2.50c, all-rail 2.59c Pac. ports, dock 2.50c; all rail 3.25c.

(Phoenix Iron Co., Phoenixville, Pa., may quote 2.35c at established basing points.) Joslyn Mfg. Co. may quote 2.35c, Chicago base.)

Rail Steel Bars: Same prices as for hot-rolled carbon bars except base is 5 tons.

(Sweet's Steel Co., Williamsport, Pa., may quote rail steel merchant bars 2.33c f.o.b. mill.

Hot-Rolled Alloy Bars: Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 2.70c Detroit 2.80c.

S.A.E.	Alloy Diff.	S.A.E.	Alloy Diff.
2000	0.35	5100 Spr. flats	0.15
2100	0.75	5100 80-1.10 Cr.	0.45
2300	1.70	6100 Bars	1.20
2500	2.55	6100 Spr. flats	0.85
3100	0.70	Carb., Van.	0.85
3200	1.35	9200 Spr. flats	0.15
3300	3.80	9200 Spr. rounds, squares	0.40
3400	3.20	T 1300, Mn, mean 1.51-2.00	0.10
4100 .15-25 Mo. 46.00 .20-.30 Mo. 1.50-2.00; Ni.	0.55 1.20	Do., carbon under 0.20 max.	0.35

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lbs., 2.65c; Detroit 2.70.

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 3.35c; Detroit 3.45c; Galveston, add $0.25, Pacific Coast $0.50.

Turned, Ground Shafting: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base (not including turning, grinding, polishing extras) 2.65c; Detroit 2.70c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base 2.15c; Detroit del. 2.25c; Gulf ports, dock 2.50c, all-rail 2.59c; Pacific ports, dock 2.80c, all-rail 3.25c.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, base 2.15c; Detroit, del. 2.25c; Gulf ports, dock 2.50c, all-rail 2.59c; Pacific ports, dock 2.80c, all-rail 3.25c.

(Sweet's Steel Co., Williamsport, Pa., may quote rail steel reinforcing bars 2.33c, f.o.b. mill.

Iron Bars: Single refined, Pitts. 4.40c, double refined 5.40c; Pittsburgh, staybolt, 5.75c; Terre Haute, common, 2.15c.

Sheets, Strip

Hot-Rolled Sheets: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Pt., Middletown, base 2.10c; Granite City, base 2.20c; Detroit del. 2.20c; Phila. del. 2.28c; New York del., 2.35c Pacific ports 2.65c.

(Andrews Steel Co. may quote hot-rolled sheets for shipment to Detroit and the Detroit area on the Middletown, O. base.)

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.05c; Granite City, base 3.15c; Detroit del. 3.15c; New York del. 3.41c; Phila. del. 3.39c; Pacific ports, 3.70c.

Galvanized Sheets, No. 24: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 3.50c; Granite City, base 3.60c; New York del. 3.74c Phila. del. 3.68c; Pacific ports 4.05c.

(Andrews Steel Co. may quote galvanized sheets 3.75c at established basing points.)

Corrugated Galv. Sheets: Pittsburgh, Chicago, Gary, Birmingham, 29 gage, per square 3.31c.

Culvert Sheets: Pittsburgh, Chicago, Gary, Birmingham, 16 gage, not corrugated, copper alloy 3.60c; copper iron 3.90c, pure iron 3.95c; zinc-coated, hot-dipped, heat-treated, No. 24, Pittsburgh 4.25c.

Enameling Sheets: Pittsburgh, Chicago, Gary,

Cleveland, Youngstown, Middletown, 10 gage, base 2.75c; Granite City, base 2.85c; Pacific ports 3.40c.
Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 20 gage, base 3.35c; Granite City, base 3.45c; Pacific ports 4.00c.

Electrical Sheets, No. 24:

	Pittsburgh Base	Pacific Ports	Granite City
Field grade	3.20c	3.95c	3.30c
Armature	3.55c	4.30c	3.65c
Electrical	4.05c	4.80c	4.15c
Motor	4.95c	5.70c	5.05c
Dynamo	5.65c	6.40c	5.75c
Transformer			
72	6.15c	6.90c	.....
65	7.15c	7.90c	.....
58	7.65c	8.40c	.....
52	8.45c	9.20c	.....

Hot-Rolled Strip: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Middletown, base, 1 ton and over, 12 inches wide and less 2.10c; Detroit del. 2.20c; Pacific ports 2.75c. (Joslyn Mfg. Co. may quote 2.30c, Chicago base.)

Cold Rolled Strip: Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less 2.80c; Chicago, base 2.90c; Detroit, del. 2.90c; Worcester base 3.00c.

Commodity C. R. Strip: Pittsburgh, Cleveland, Youngstown, base 3 tons and over, 2.95c; Worcester base 3.35c.

Cold-Finished Spring Steel: Pittsburgh, Cleveland bases, add 20c for Worcester; .26-.50 Carb., 2.80c; .51-.75 Carb., 4.30c; .76-1.00 Carb., 6.15c; over 1.00 Carb., 8.35c.

Tin, Terne Plate

Tin Plate: Pittsburgh, Chicago, Gary, 100-lb. base box, $5.00; Granite City $5.10.

Tin Mill Black Plate: Pittsburgh, Chicago, Gary, base 29 gage and lighter, 3.05c; Granite City, 3.15c; Pacific ports, boxed 4.05c.

Long Ternes: Pittsburgh, Chicago, Gary, No. 24 unassorted 3.80c.

Manufacturing Ternes: Pittsburgh, Chicago, Gary, 100-base box $4.30; Granite City $4.40.

Roofing Ternes: Pittsburgh base per package 112 sheets, 20 x 28 in., coating I.C., 8-lb. $12.00; 15-lb. $14.00; 20-lb. $15.00; 25-lb. $16.00; 30-lb. $17.25; 40-lb. $19.50.

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, Coatesville, Claymont, 2.10c; New York, del., 2.30-2.55c; Phila., del., 2.15c; St. Louis, 2.34c; Boston, del., 2.42-67c; Pacific ports, 2.65c; Gulf Ports, 2.45c. (Central Iron & Steel Co. may quote carbon steel plates at 2.35c at established basing points; Granite City Steel Co. may quote ship plates 2.25c, f.o.b. mill.)

Floor Plates: Pittsburgh, Chicago, 3.35c; Gulf ports, 3.70c; Pacific ports, 4.00c.

Open-Hearth Alloy Plates: Pittsburgh, Chicago, Coatesville, 3.50c.

Wrought Iron Plates: Pittsburgh, 3.80c.

Shapes

Structural Shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.10c; New York, del., 2.28c Phila., del., 2.22c; Gulf ports, 2.45c; Pacific ports, 2.75c. (Phoenix Iron Co., Phoenixville, Pa. may quote carbon steel shapes at 2.30c at established basing points.)

Steel Sheet Piling: Pittsburgh, Chicago, Buffalo, 2.40c.

Wire Products, Nails

Wire: Pittsburgh, Chicago, Cleveland, Birmingham (except spring wire) to manufacturers in carloads (add $2 for Worcester):

Bright basic, bessemer wire	2.60c
Galvanized wire	2.60c
Spring wire	3.20c
Wire Products to the Trade:	
Standard and cement-coated wire nails, polished and staples, 100-lb. keg	$2.55
Annealed fence wire, 100 lb.	3.05
Galvanized fence wire, 100 lb.	3.40
Woven fence, 12½ gage and lighter, per base column	67
Do., 11 gage and heavier	70
Barbed wire, 80-rod spool, col.	70
Twisted barbless wire, col.	70
Single loop bale ties, col.	59
Fence posts, carloads, col.	69
Cut nails, Pittsburgh, carloads	$3.85

Pipe, Tubes

Welded Pipe: Base price in carloads to consumers about $200 per net ton. Base discounts on steel pipe Pittsburgh and Lorain, O.; Gary, Ind. 2 points less on lap weld, 1 point less on butt weld. Pittsburgh base only on wrought iron pipe.

Butt Weld

In.	Steel Blk.	Steel Galv.	In.	Iron Blk.	Iron Galv.
⅛	56	33	⅛	24	3½
¼ & ⅜	59	40½	¼	30	10
½	63½	51	1-1¼	34	16
⅝	66½	55	1½	38	18½
1-3	68½	57½	2	37½	18

Lap Weld

In.	Steel Blk.	Steel Galv.	In.	Iron Blk.	Iron Galv.
2	61	48½	1¼	23	3½
2½-3	64	52½	1½	28½	10
3½-6	66	54½	2	30½	12
7-8	65	52½	2½, 3½	31½	14½
9-10	64½	52	4	33½	18
11-12	63½	51	4½-8	32½	17
			9-12	28½	12

Boiler Tubes: Net base prices per 100 feet, f.o.b. Pittsburgh in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

O. D. Sizes	B.W.G.	—Seamless— Hot Rolled	Cold Drawn	—Lap Weld— Steel	Charcoal Iron
1"	13	$ 7.82	$ 9.01	.....	.....
1¼"	13	9.26	10.67	.....	.....
1½"	13	10.23	11.72	$ 9.72	$23.71
1⅝"	13	11.64	13.42	11.06	22.93
2"	13	13.04	15.03	12.38	19.35
2¼"	13	14.54	16.76	13.79	21.63
2½"	12	16.01	18.45	15.16	.....
2⅝"	12	17.54	20.21	16.58	26.57
2¾"	12	18.59	21.42	17.54	29.00
3"	12	19.50	22.48	18.35	31.38
3½"	11	24.63	28.37	23.15	39.81
4"	10	30.54	35.20	28.66	49.90
4½"	10	37.35	43.04	35.22	.....
5"	9	46.87	54.01	44.25	73.93
6"	7	71.96	82.93	68.14	.....

Rails, Supplies

Standard rails, over 60-lb., f.o.b. mill, gross ton, $40.00.
Light rails (billet), Pittsburgh, Chicago, Birmingham, gross ton, $40.00.
*Relaying rails, 35 lbs. and over, f.o.b. railroad and basing points, $28-$30.
Supplies: Angle bars, 2.70c; tie plates, 2.15c; track spikes, 3.00c; track bolts, 4.75c; do. heat treated, 5.00c.

*Fixed by OPA Schedule No. 46, Dec. 15, 1941.

Tool Steels

Tool Steels: Pittsburgh, Bethlehem, Syracuse, base, cents per lb.: Reg. carbon 14.00c; extra carbon 18.00c; special carbon 22.00c; oil-hardening 24.00c; high car.-chr. 43.00c.

High Speed Tool Steels:

Tung.	Chr.	Van.	Moly.	Pitts. base, per lb.
18.00	4	1		67.00c
18.00	4	2	1	77.00c
18.00	4	3	1	87.00c
1.5	4	1	8.5	54.00c
.....	4	2	8	54.00c
5.50	4	1.50	4	57.50c
5.50	4.50	4	4.50	70.00c

Stainless Steels

Base, Cents per lb.—f.o.b. Pittsburgh

CHROMIUM NICKEL STEEL

Type	Bars	Plates	Sheets	H. R. Strip	C. R. Strip
302	24.00c	27.00c	34.00c	21.50c	28.00c
303	26.00	29.00	36.00	27.00	33.00
304	25.00	29.00	36.00	23.50	30.00
308	29.00	34.00	41.00	28.50	35.00
309	36.00	40.00	47.00	37.00	47.00
310	49.00	52.00	53.00	48.75	56.00
311	49.00	52.00	53.00	48.75	56.00
312	36.00	40.00	49.00	.....	.....
*316	40.00	44.00	48.00	40.00	48.00
*317	50.00	54.00	58.00	50.00	58.00
†321	29.00	34.00	41.00	29.25	38.00
‡347	33.00	38.00	45.00	33.00	42.00
431	19.00	22.00	29.00	17.50	22.50

STRAIGHT CHROMIUM STEEL

403	21.50	24.50	29.50	21.25	27.00
**410	18.50	21.50	26.50	17.00	22.00
416	19.00	22.00	27.00	18.25	23.50
††420	24.00	28.50	33.50	23.75	36.50
430	19.00	22.00	29.00	17.50	22.50
‡‡430F	19.50	22.50	29.50	18.75	24.50
442	22.50	25.50	32.50	24.00	32.00
446	27.50	30.50	36.50	35.00	52.00
501	8.00	12.00	15.75	12.00	17.00
502	9.00	13.00	16.75	13.00	18.00

STAINLESS CLAD STEEL (20%)

304	.....	‡‡18.00	19.00	.....	.....

*With 2-3% moly. †With titanium. ‡With columbium. **Plus machining agent. ††High carbon. ‡‡Free machining. ‡‡Includes annealing and pickling.

Basing Point Prices are (1) those announced by U. S. Steel Corp. subsidiaries for first quarter of 1941 or in effect April 16, 1941 at designated basing points or (2) those prices announced or customarily quoted by other producers at the same designated points. Base prices under (2) cannot exceed those under (1) except to the extent prevailing in third quarter of 1940.

Extras mean additions or deductions from base prices in effect April 16, 1941.

Delivered prices applying to Detroit, Eastern Michigan, Gulf and Pacific Coast points are deemed basing points except in the case of the latter two areas when water transportation is not available, in which case nearest basing point price plus all-rail freight may be charged.

Domestic Ceiling prices are the aggregate of (1) governing basing point price, (2) extras and (3) transportation charges to the point of delivery as customarily computed. **Governing basing point** is basing point nearest the consumer providing the lowest delivered price. **Emergency basing point** is the basing point at or near the place of production or origin of shipment.

Dislocated tonnage: Producers shipping material outside their usual marketing areas because of the war emergency may charge the basing point price nearest place of production plus actual cost of transportation to destination.

Seconds or off-grade iron or steel products cannot be sold at delivered prices exceeding those applying to material of prime quality.

Export ceiling prices may be either the aggregate of (1) governing basing point or emergency basing point (2) export extras (3) export transportation charges provided they are the f.a.s. seaboard quotations of the U. S. Steel Export Co. on April 16, 1941. Domestic or export extras may be used in case of Lease-Lend tonnage.

Bolts, Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%.

Carriage and Machine

½ x 6 and smaller	65½ off
Do., ⅝ and ⅞ x 6-in. and shorter	63½ off
Do., ⅞ to 1 x 6-in. and shorter	61 off
1⅛ and larger, all lengths	59 off
All diameters, over 6-in. long	59 off
Tire bolts	50 off

Stove Bolts

In packages with nuts separate 71-10 off; with nuts attached 71 off; bulk 80 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Step bolts	56 off
Plow bolts	65 off

Nuts

Semifinished hex.	U.S.S.	S.A.E.
½-inch and less	62	64
⅝-1-inch	59	60
1⅛-1½-inch	57	58
1⅝ and larger	56	..

Hexagon Cap Screws

Upset 1-in., smaller	60 off

Square Head Set Screws

Upset, 1-in., smaller	68 off
Headless, ¼-in., larger	55 off
No. 10, smaller	60 off

Piling

Pittsburgh, Chicago, Buffalo 2.40c

Rivets, Washers

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham

Structural	3.75c
⅞-inch and under	65-5 off
Wrought washers, Pittsburgh, Chicago Philadelphia, to jobbers and large nut, bolt manufacturers l.c.l.	$2.75-3.00 off

Metallurgical Coke

Price Per Net Ton

Beehive Ovens

Connellsville, furnace	$6.00
Connellsville, foundry	7.00- 7.50
Connellsville prem. fdry.	7.25- 7.60
New River, foundry	8.00- 8.25
Wise county, foundry	7.50
Wise county, furnace	6.50

By-Product Foundry

Kearny, N. J., ovens	12.15
Chicago, outside delivered	11.50
Chicago, delivered	12.25
Terre Haute, delivered	12.00
Milwaukee, ovens	12.25
New England, delivered	13.75
St. Louis, delivered	12.25
Birmingham, ovens	8.50
Indianapolis, delivered	12.00
Cincinnati, delivered	11.75
Cleveland, delivered	12.30
Buffalo, delivered	12.50
Detroit, delivered	12.25
Philadelphia, delivered	12.38

Coke By-Products

Spot, gal., freight allowed east of Omaha

Pure and 90% benzol	15.00c
Toluol, two degree	28.00c
Solvent naphtha	27.00c
Industrial xylol	27.00c
Per lb. f.o.b. works	
Phenol (car lots, returnable drums)	12.50c
Do. less than car lots	13.25c
Do. tank cars	11.50c
Eastern Plants, per lb.	
Naphthalene flakes, balls, bbls. to jobbers	8.00c
Per ton, bulk, f.o.b. port	
Sulphate of ammonia	$29.00

Pig Iron

Prices (in gross tons) are maximums fixed by OPA Price Schedule No. 10, effective June 10, 1941. Exceptions indicated in footnotes. Allocation regulations from WPB Order M-17, expiring Dec. 31, 1942. Base prices bold face, delivered light face.

	No. 2 Foundry	Basic	Bessemer	Malleable
Bethlehem, Pa., base	$25.00	$24.50	$26.00	$25.50
Newark, N. J., del.	26.62	26.12	27.62	27.12
Brooklyn, N. Y., del.	27.65	.....	.....	28.15
Birdsboro, Pa., del.	25.00	24.50	26.00	25.50
Birmingham, base	†20.38	†19.00	.....	.....
Baltimore, del.	25.67	.....	.....	.....
Boston, del.	25.12	.....	.....	.....
Chicago, del.	‡24.47	.....	.....	.....
Cincinnati, del.	24.30	22.84	.....	.....
Cleveland, del.	24.12	23.24	.....	.....
Newark, N. J., del	26.24	.....	.....	.....
Philadelphia, del.	25.51	25.01	.....	.....
St. Louis, del.	‡24.12	23.24	.....	.....
Buffalo, base	24.00	23.00	25.00	24.50
Boston, del.	25.50	25.00	26.50	26.00
Rochester, del.	25.53	.....	26.53	26.03
Syracuse, del.	26.08	.....	27.08	26.58
Chicago, base	24.00	23.50	24.50	24.00
Milwaukee, del.	25.17	24.67	25.67	25.17
Muskegon, Mich., del.	27.38	.....	.....	27.38
Cleveland, base	24.00	23.50	24.50	24.00
Akron, Canton, O., del.	25.47	24.97	25.97	25.47
Detroit, base	24.00	23.50	24.50	24.00
Saginaw, Mich., del.	26.45	25.95	26.95	26.45
Duluth, base	24.50	.....	25.00	24.50
St. Paul, del.	26.76	.....	27.26	26.76
Erie, Pa., base	24.00	23.50	25.00	24.50
Everett, Mass., base	25.00	24.50	26.00	25.50
Boston	25.50	25.00	26.50	26.00
Granite City, Ill., base	24.00	23.50	24.50	24.00
St. Louis, del.	24.50	24.00	.....	24.50
Hamilton, O., base	24.00	23.50	.....	24.00
Cincinnati, del.	24.68	24.68	.....	25.35
Neville Island, Pa., base	24.00	23.50	24.50	24.00
‡Pittsburgh, del., No. & So. sides	24.69	24.19	25.19	24.69
Provo, Utah, base	22.00	.....	.....	.....
Sharpsville, Pa., base	24.00	23.50	24.50	24.00
Sparrows Point, Md., base	25.00	24.50	.....	.....
Baltimore, del.	26.05	.....	.....	.....
Stepton, Pa., base	.....	24.50	.....	25.50
Swedeland, Pa., base	25.00	24.50	26.00	25.50
Philadelphia, del.	25.89	25.39	.....	26.39
Toledo, O., base	24.00	23.50	24.50	24.00
Mansfield, O., del.	26.06	25.56	26.56	26.06
Youngstown, O., base	24.00	23.50	24.50	24.00

*Basic silicon grade (1.75-2.25%), add 50c for each 0.25%. †For phosphorous 0.70 and over deduct 38c. ‡Over 0.70 phos. ‖For McKees Rocks, Pa., add .55 to Neville Island base; Lawrenceville, Homestead, McKeesport, Ambridge, Monaca, Aliquippa, .84; Monessen, Monongahela City .97 (water); Oakmont, Verona 1.11; Brackenridge 1.24.

High Silicon, Silvery

6.00-6.50 per cent (base)	$29.50		
6.51-7.00	$30.50	9.01- 9.50	$35.50
7.01-7.50	31.50	9.51-10.00	36.50
7.51-8.00	32.50	10.01-10.50	37.50
8.01-8.50	33.50	10.51-11.00	38.50
8.51-9.00	34.50	11.01-11.50	39.50

F.o.b. Jackson county, O., per gross ton. Buffalo base prices are $1.25 higher. Prices subject to additional charge of 50 cents a ton for each 0.50% manganese in excess of 1.00%.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton. (For higher silicon irons a differential over and above the price of base grades is charged as well as for the hard chilling irons, Nos. 5 and 6.)

Charcoal Pig Iron

Northern

Lake Superior Furn.	$28.00
Chicago, del.	31.54

Southern

Semi-cold blast, high phos., f.o.b. furnace, Lyles, Tenn.	$28.50
Semi-cold blast, low phos., f.o.b furnace, Lyles, Tenn.	33.00

Gray Forge

Neville Island, Pa.	$23.50
Valley base	23.50

Low Phosphorus

Basing points: Birdsboro and Steelton, Pa., and Buffalo, N. Y., $29.50 base; $30.81, delivered, Philadelphia.

Switching Charges: Basing point prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Silicon Differentials: Basing point prices are subject to an additional charge not to exceed 50 cents a ton for each 0.25 silicon in excess of base grade (1.75 to 2.25%).

Phosphorous Differential: Basing point prices are subject to a reduction of 38 cents a ton for phosphorous content of 0.70% and over.

Manganese Differentials: Basing point prices subject to an additional charge not to exceed 50 cents a ton for each 0.50% manganese content in excess of 1.0%.

Ceiling prices are the aggregate of (1) governing basing point (2) differentials (3) transportation charges from governing basing point to point of delivery as customarily computed. Governing basing point is the one resulting in the lowest delivered price for the consumer.

Exceptions to Ceiling Prices: Pittsburgh Coke & Iron Co. (Sharpsville, Pa. furnace only) and Struthers Iron & Steel Co. may charge 50 cents a ton in excess of basing point prices for No. 2 Foundry, Basic, Bessemer and Malleable.

Export Prices: In case of exports only, the governing basing point nearest point of production may be used, plus differentials and export transportation charges.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick

Super Quality

Pa., Mo., Ky.	$64.60

First Quality

Pa., Ill., Md., Mo., Ky.	51.30
Alabama, Georgia	51.30
New Jersey	56.00

Second Quality

Pa., Ill., Ky., Md., Mo.	46.55
Georgia, Alabama	38.00
New Jersey	49.00

Ohio

First quality	43.00
Intermediate	36.10
Second quality	36.00

Malleable Bung Brick

All bases	$59.85

Silica Brick

Pennsylvania	$51.30
Joliet, E. Chicago	58.90
Birmingham, Ala.	51.30

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry press	$31.00
Wire cut	29.00

Magnesite

Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk	22.00
net ton, bags	26.00

Basic Brick

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	$54.00
Chem. bonded chrome	54.00
Magnesite brick	76.00
Chem. bonded magnesite	65.00

Fluorspar

Washed gravel, duty pd., tide, net ton	nominal
Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all rail	$25.00
Do., barge	25.00
No. 2 lump	25.00

Ferroalloy Prices

Ferromanganese, 78-82%,
Carlots, duty pd., seab'd $120.00
Carlots, del. Pittsburgh 125.63
Carlots, f.o.b. So. f'ces 140.00
Add $10 for ton, $13.50 for less ton, $18 for less than 200-lb. lots.

Spiegeleisen, 19-21%, gross ton, Palmerton $36.00

Manganese Briquets, Contract carloads, bulk freight allowed, per lb. 5.50c
Packed 5.75c
Ton lots 6.00c
Less-ton lots 6.25c
Less 200-lb. lots 6.50c
Spot ¼c higher.

Manganese Electro, 99.9+%, less car lots 42.00c

Chromium Metal, per lb. contained chromium

	Contract	Spot
98% Cr. ton lots	80.00c	85.00c
88% Cr. ton lots	79.00c	84.00c

Ferrocolumbium, 50-60% f.o.b. Niagara Falls, per lb. contained Cb on contract $2.25
Less-ton lots 2.30
(Spot 10c higher)

Chromium Briquets, per lb., freight allowed

	Contract	Spot
Carlots	8.25c	8.50c
Packed	8.50c	8.75c
Ton lots	8.75c	9.00c
Less-ton lots	9.00c	9.25c
Less 200 lbs.	9.25c	9.50c

Ferrochrome, 66-70%, freight allowed, 4-6% carbon, per pound contained (chrome)

Carloads	13.00c
Ton lots	13.75c
Less-ton lots	14.00c
Less than 200-lb. lots	14.25c

67-72%, low carbon, cts. per pound:

	Car loads	Ton lots	Less ton	Less 200 lbs.
2% C.	19.50	20.25	20.75	21.00
1% C.	20.50	21.25	21.75	22.00
0.20% C.	21.50	22.25	22.75	23.00
0.10% C.	22.50	23.25	23.75	24.00

Spot is ¼c higher.

Ferromolybdenum, 55-75%, per lb. contained molybdenum, f.o.b. furnace 95.00c

Calcium Molybdate (Molyte), 40-45% Mo., per lb. contracts, f.o.b. producers plant 80.00c

Molybdic Oxide Briquets, 48-52% Mo. per lb. contained, f.o.b. producers plant 30.00c

Molybdenum Oxide, (In 5 and 20 lb. mo. contained cans) 53-63 mo. per lb. contained f.o.b. producers' plants 80.00c

Molybdenum Powder, 99%, f.o.b. York, Pa., per lb. in 200-lb. kegs $2.60
Do., 100-200 lb. lots 2.75
Do., under 100-lb. lots 3.00

Ferrophosphorus, .17-19%, gross ton carloads, f.o.b. sellers' works, $3 unitage, freight equalized with Rockdale, Tenn. for 18% phos.
Contract $58.50
Spot 62.25
23-26%, $3 unitage, freight equalized with Mt. Pleasant, Tenn., for 24% phos.
Contract 75.00
Spot 80.00

Ferrosilicon, Gross tons, freight allowed, bulk

	Carloads	Ton lots
50%	$ 74.50	$87.00
Unitage	1.50	1.75
75%	135.00	151.00
Unitage	1.80	2.00
85%	170.00	188.00
Unitage	2.00	2.20
90-95%	10.25c	11.25c

(Above for contracts; spot ¼c higher)

Silicon Metal, Spot ¼-cent higher (Per Lb., Contracts):

	1% Iron	2% Iron
Carlots	14.50c	13.00c
Ton lots	15.00c	13.50c
Less-ton lots	15.25c	13.75c
Less 200 lbs.	15.50c	14.00c

Silicon Briquets, Contract carloads, bulk freight allowed, per ton $74.50
Packed 80.50
Ton lots 84.50
Less-ton lots, per lb. 4.00c
Less 200-lb. lots 4.25c
Spot ¼c higher on less ton lots; $5 higher on ton lots and over.

Silicomanganese,

Carbon	1½%
Carloads (contract)	$128.00
Ton Lots (contract)	140.50

Freight allowed spot $5 above contract

Ferrotungsten, (All prices nominal) Carlots, per lb. contained tungsten $1.90

Tungsten Metal Powder, (Prices Nominal) 98-99 per cent, per pound, depending upon quantity $2.55-$2.65

Ferrotitanium, 40-45%, f.o.b. Niagara Falls, per lb. contained in ton lots $1.23
Less ton lots 1.25
20-25%, C. 0.10 max., in ton lots per lb. contained Ti 1.35
Less-ton lots 1.40
(Spot 5c higher)

Ferro-Carbon-Titanium, 15-20% Titanium,

	6-8% C	3-5% C
Carlots, contract, f.o.b. Niagara Falls, freight allowed to destinations east of Mississippi and north of Baltimore and St. Louis	$142.50	$157.50

Ferrovanadium, 35-40%, contract per pound contained vanadium $2.70-$2.80-$2.90
(Spot 10c higher)

Vanadium Pentoxide, Per lb. contained, contracts 1.10
Do., spot 1.15

Zirconium Alloy, 12-15%, carloads, contract, bulk $102.50
Packed 107.50
Ton lots 108.00
Less ton lots 112.50
Spot $5 a ton higher

35-40%, contract, carloads, bulk or package, per lb. alloy 14.00c
Do., ton lots 15.00c
Do., less-ton lots 16.00c
Spot is ¼-cent higher

Alsifer, Per lb., f.o.b. Niagara Falls.

	Contract	Spot
Carlots	7.50c	8.00c
Ton lots	8.00c	8.50c

Simanal, Per lb. of alloy, contracts, freight allowed (approx. 20% Si, 20% Mn, 20% Al)

Carlots	Ton Lots	Less Ton Lots
10.50c	11.00c	11.50c

WAREHOUSE STEEL PRICES

Base Prices in Cents Per Pound, Delivered Locally, Subject to Prevailing Differentials. As of April 16, 1941

	Soft Bars	Hot-rolled Strip Bands	Hot-rolled Strip Hoops	Plates ¼-in. & Over	Structural Shapes	Floor Plates	Sheets Hot Rolled	Sheets Cold Rolled	Sheets Galv. No. 24	Cold Rolled Strip	Cold Drawn Bars Carbon	Cold Drawn Bars S.A.E. 2300	Cold Drawn Bars S.A.E. 3100
Boston	3.98	4.06	5.06	3.85	3.85	5.66	3.71	4.68	5.11	3.46	4.13	8.88	7.23
New York (Met.)	3.84	3.96	3.96	3.76	3.75	5.56	3.58	4.60	5.00	3.51	4.09	8.84	7.19
Philadelphia	3.83	3.95	4.45	3.55	3.55	5.25	3.53	4.05	4.65	3.31	4.06	8.56	7.16
Baltimore	3.85	4.00	4.35	3.70	3.70	5.25	3.50	....	5.05	....	4.04	....	....
Norfolk, Va.	4.00	4.10	....	4.05	4.05	5.45	3.85	....	5.40	....	4.15	....	....
Buffalo	3.35	3.82	3.82	3.62	3.40	5.25	3.25	4.30	4.75	3.52	3.75	8.40	6.75
Pittsburgh	3.35	3.60	3.60	3.40	3.40	5.00	3.35	.	4.65	....	3.65	8.40	6.75
Cleveland	3.25	3.50	3.50	3.40	3.56	5.18	3.35	4.05	4.62	3.20	3.75	8.40	6.75
Detroit	3.42	3.43	3.68	3.60	3.65	5.27	3.43	4.30	4.84	3.40	3.80	8.70	7.05
Omaha	4.10	4.20	4.20	4.15	4.15	5.75	3.85	5.32	5.50	....	4.42	..	.
Cincinnati	3.60	3.67	3.67	3.63	3.68	5.28	3.42	4.37	4.92	3.45	4.00	8.75	7.10
Chicago	3.50	3.60	3.60	3.55	3.55	5.15	3.25	4.10	4.85	3.50	3.75	8.40	6.75
Twin Cities	3.75	3.85	3.85	3.80	3.80	5.40	3.50	4.35	5.00	3.83	4.34	9.09	7.44
Milwaukee	3.63	3.53	3.53	3.68	3.68	5.28	3.38	4.23	4.98	3.54	3.88	8.38	6.98
St. Louis	3.64	3.74	3.74	3.69	3.69	5.29	3.39	4.24	4.99	3.61	4.02	8.77	7.12
Indianapolis	3.60	3.75	3.75	3.70	3.70	5.30	3.45	....	5.01	...	3.97	....	..
Chattanooga*	3.80	4.00	4.00	3.85	3.85	5.80	3.75	....	4.50	....	4.39	....	....
Memphis	3.90	4.10	4.10	3.95	3.95	5.71	3.85	..	5.25	.. ..	4.31	....	..
Birmingham	3.50	3.70	3.70	3.55	3.55	5.93	3.45	....	4.75	.	4.43	....	..
New Orleans	4.00	4.10	4.10	3.80	3.80	5.75	3.85	....	5.25	5.00	4.60	....	....
Houston, Tex.	3.75	4.30	4.30	4.05	4.05	5.50	4.00	....	5.25	....	6.90	....	....
Seattle	4.35	4.35	.	4.35	4.35	6.10	4.35	6.35	5.60	....	5.75	....	....
Los Angeles	4.50	4.95	6.80	4.50	4.50	6.75	4.65	6.50	5.85	....	6.10	10.55	9.55
San Francisco	4.10	4.60	6.35	4.25	4.25	5.95	4.25	6.40	6.00	....	6.80	10.80	9.80

*Not named in OPA price order.

	S.A.E. Hot-rolled Bars (Unannealed) 1035-1050	2300 Series	3100 Series	4100 Series	6100 Series
Boston	4.28	7.75	6.05	5.80	7.90
New York (Met.)	4.04	7.60	5.90	5.65	....
Philadelphia	4.10	7.56	5.86	5.61	8.56
Baltimore	4.45	....	....	....	....
Norfolk, Va.	....	....	....	....	....
Buffalo	3.55	7.35	5.65	5.40	7.50
Pittsburgh	3.40	7.45	5.75	5.50	7.60
Cleveland	3.30	7.55	5.85	5.85	7.70
Detroit	3.48	7.67	5.97	5.72	7.19
Cincinnati	3.65	7.69	5.99	5.74	7.84
Chicago	3.70	7.35	5.65	5.40	7.50
Twin Cities	3.95	7.70	6.00	6.09	8.19
Milwaukee	3.83	7.33	5.88	5.63	7.73
St. Louis	3.84	7.72	6.02	5.77	7.87
Seattle	6.25	....	8.00	7.85	8.65
Los Angeles	4.80	9.55	8.55	8.40	8.80
San Francisco	5.60	9.80	8.80	8.65	9.05

BASE QUANTITIES

Soft Bars, Bands, Hoops, Plates, Shapes, Floor Plates, Hot Rolled Sheets and SAE 1035-1050 Bars: Base, 400-1999 pounds; 300-1999 pounds in Los Angeles; 400-39,999 (hoops, 0-299) in San Francisco; 300-4999 pounds in Portland; 300-9999 Seattle; 400-14,999 pounds in Twin Cities; 400-3999 pounds in B'ham., Memphis.

Cold Rolled Sheets: Base, 400-1499 pounds in Chicago, Cincinnati, Cleveland, Detroit, New York, Omaha, Kansas City, St. Louis; 450-3749 in Boston; 500-1499 in Buffalo; 1000-1999 in Philadelphia, Baltimore; 750-4999 in San Francisco; 300-4999 in Portland, Seattle; any quantity in Twin Cities, New Orleans; 300-1999 Los Angeles.

Galvanized Sheets: Base, 150-1499 pounds, New York; 150-1499 in Cleveland, Pittsburgh, Baltimore, Norfolk; 150-1049 in Los Angeles; 300-4999 in Portland, Seattle; 450-3749 in Boston; 500-1499 in Birmingham, Buffalo, Chicago, Cincinnati, Detroit, Indianapolis, Milwaukee, Omaha, St. Louis, Tulsa; 3500 and over in Chattanooga; any quantity in Twin Cities; 750-1500 in Kansas City; 150 and over in Memphis; 25 to 49 bundles in Philadelphia; 750-4999 in San Francisco.

Cold Rolled Strip: No base quantity; extras apply on lots of all size.

Cold Finished Bars: Base, 1500 pounds and over on carbon, except 0-299 in San Francisco, 500-999, Los Angeles, 1000 and over in Portland, Seattle; 1000 pounds and over on alloy, except 0-4999 in San Francisco.

SAE Hot Rolled Alloy Bars: Base, 1000 pounds and over, except 0-4999, San Francisco; 0-1999, Portland, Seattle.

EUROPEAN IRON, STEEL PRICES

Dollars at $4.02½ per Pound Sterling

Export Prices f.o.b. Port of Dispatch—

By Cable or Radio

	BRITISH Gross Tons f.o.b. U.K. Ports	£	s	d
Merchant bars, 3-inch and over	$66.50	16	10	0
Merchant bars, small, under 3-inch, re-rolled	3.60c	20	0	0
Structural shapes	2.95c	15	10	0
Ship plates	2.90c	16	2	6
Boiler plates	3.17c	17	12	6
Sheets, black, 24 gage	4.00c	22	5	0
Sheets, galvanized, corrugated, 24 gage	4.61c	25	12	6
Tin plate, base box, 20 x 14, 108 pounds	$ 6.20	1	10	9

British ferromanganese $120.00 delivered Atlantic seaboard duty-paid.

Domestic Prices Delivered at Works or Furnace—

	£	s	d
Foundry No. 3 Pig Iron, Silicon 2.50—3.00	$25.79	6	8 0(a)
Basic pig iron	24.28	6	0 6(a)
Furnace coke, f.o.t. ovens	7.56	1	17 6
Billets, basic soft, 100-ton lots and over	49.37	12	5 0
Standard rails, 60 lbs. per yard, 500-ton lots & over	2.61c	14	10 6
Merchant bars, rounds and squares, under 3-inch	3.17c	17	12 0††
Shapes	2.77c	15	8 0††
Ship plates	2.91c	16	3 0††
Boiler plates	3.06c	17	0 6††
Sheets, black, 24 gage, 4-ton lots and over	4.10c	22	15 0
Sheets, galvanized 24 gage, corrugated, 4-ton lots & over	4.70c	26	2 6
Plain wire, mild drawn, catch weight coils, 2-ton lots and over	4.28c	23	15 0
Bands and strips, hot-rolled	3.30c	18	7 0

(a) del. Middlesbrough 5s rebate to approved customers. ††Rebate 15s on certain conditions.

Ores

Lake Superior Iron Ore

Gross ton, 51½% Lower Lake Ports

Old range bessemer	$4.75
Mesabi nonbessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer	4.60

Eastern Local Ore

Cents, unit, del. E. Pa.

Foundry and basic 56-63%, contract	12.00

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mang.	Nom.
N. African low phos.	Nom.
Spanish, No. African basic, 50 to 60%	Nom.
Chinese wolframite, net ton, duty pd.	$24.00
Brazil iron ore, 68-69% ord.	7.50c
Low phos. (.02 max.) F.O.B. Rio Janeiro.	8.00c
Scheelite, imp.	23.50-24.00

Chrome Ore

Gross ton c.i.f. Baltimore; dry basis; subject to penalties for guarantees

Indian and African, 2.8:1 lump, 48%	$39.00
South African (excluding war risk) No ratio lump, 44%	28.00
Do. 45%	29.00
Do. 48%	34.00
Do. concentrates, 48%	33.00
Do. 50%	34.00
Brazilian (nominal) 2.5:1 lump, 44%	31.00
2.8:1 lump, 44%	32.50
3:1 lump, 48%	41.00
No ratio lump, 48%	35.00-35.50
Do. concentrate, 48%	33.00-33.50
Philippine (nominal) No ratio lump, 45%	32.00
2.8:1 lump, 48%	40.00
Do., concentrate, 48%	39.00
2.5:1 concentrate, 48%	36.50
No ratio concentrate, 48%	34.00
No ratio lump, 48%	35.00
Rhodesian	nominal

Manganese Ore

Including war risk but not duty, cents per unit cargo lots

Caucasian, 50-52%	
S. African, 48%	65.00
Indian, 50%	66.00
Brazilian, 48%	
Chilean, 48%	
Cuban, 51%, duty free	83.00-85.00

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

MAXIMUM PRICES FIXED BY OPA ON IRON AND STEEL SCRAP

Other than railroad grades quoted on the basis of basing point prices from which shipping point prices and consumers' delivered prices are to be computed. Scrap originating from railroads quoted delivered to consumers' plants located on the line of the railroad from which the material originated. All prices in gross tons. A basing point includes its switching district.

PRICES FOR OTHER THAN RAILROAD SCRAP

				ELECTRIC FURNACE AND FOUNDRY GRADES										
				Low Phos. Grades					Cut Auto Scrap					
	OPEN HEARTH GRADES*	Machine Shop Turnings	BLAST FURNACE GRADES*	Billet, Bloom Forge Crops	Bar Crops and smaller; Punchings, Plate	Heavy Structural, Plate 3 ft. and less	Heavy Structural, Plate 2 ft. and less	Heavy Structural, Plate 1 ft. and less	3 ft. and less	2 ft. and less	1 ft. and less	Alloy-Free Low Phos. & Sulphur Turnings	First Cut Heavy Axle & Forge Turnings	Electric Furnace Bundles
Pittsburgh, Brackenridge, Butler, Johnstown, Midland, Monessen, Sharon, Steubenville, Weirton, Canton, Youngstown, Warren	$20.00	$16.00	$16.00	$25.00	$22.50	$21.00	$21.50	$22.00	$20.00	$20.50	$21.00	$18.00	$19.50	$21.00
Claymont, Coatesville, Harrisburg, Conshohocken, Phoenixville	18.75	14.75	14.75	23.75	21.25	19.75	20.25	20.75	18.75	19.25	19.75	16.75	18.25	19.75
Bethlehem	18.25	14.25	14.25	23.25	20.75	19.25	19.75	20.25	18.25	18.75	19.25	16.25	17.75	19.25
Buffalo	19.25	15.25	15.25	24.25	21.75	20.25	20.75	21.25	19.25	19.75	20.25	17.25	18.75	20.25
Cleveland, Middletown, Cincinnati, Portsmouth, Ashland	19.50	15.50	15.50	24.50	22.00	20.50	21.00	21.50	19.50	20.00	20.50	17.50	19.00	20.50
Detroit	17.85	13.85	13.85	22.85	20.35	18.85	19.35	19.85	17.85	18.35	18.85	15.85	17.35	18.85
Toledo	.....	13.85	13.85	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Chicago	18.75	14.75	14.75	23.75	21.25	19.75	20.25	20.75	18.75	19.25	19.75	16.75	18.25	19.75
Kokomo	18.25	14.25	14.25	23.25	20.75	19.25	19.75	20.25	18.25	18.75	19.25	16.25	17.75	19.25
Duluth	18.00	14.00	14.00	23.00	20.50	19.00	19.50	20.00	18.00	18.50	19.00	16.00	17.50	19.00
St. Louis	17.50	13.50	13.50	22.50	20.00	18.50	19.00	19.50	17.50	18.00	18.50	15.50	17.00	18.50
Birmingham, Atlanta, Alabama City, Los Angeles, San Francisco, Pittsburg, Calif.	17.00	13.00	13.00	22.00	19.50	18.00	18.50	19.00	17.00	17.50	18.00	15.00	16.50	18.00
Minnequa, Colo.	16.50	12.50	12.50	21.50	19.00	17.50	18.00	18.50	16.50	17.00	17.50	14.50	16.00	17.50
Seattle	14.50	10.50	10.50	19.50	17.00	15.50	16.00	16.50	14.50	15.00	15.50	12.50	14.00	15.50
Portland, Oreg.	.....	.....	.....	.....	15.50	14.00	14.50	15.00	13.00	13.50	14.00	11.00	12.50	14.00

RAILROAD SCRAP

	Heavy Melting Steel	Scrap Rails	Rails for Rolling	Scrap Rails 3 ft. and under	Scrap Rails 2 ft. and under	Scrap Rails 18 in. and under
Pittsburgh, Wheeling, Steubenville, Sharon, Youngstown, Canton	21.00	22.00	23.50	24.00	24.25	24.50
Philadelphia, Wilmington, Sparrows Point	19.75	20.75	22.25	22.75	23.00	23.25
Cleveland, Cincinnati, Middletown, Ashland, Portsmouth	20.50	21.50	23.00	23.50	23.75	24.00
Chicago	19.75	20.75	22.25	22.75	23.00	23.25
Buffalo	20.25	21.25	22.75	23.25	23.50	23.75
Detroit	18.85	19.85	21.35	21.85	22.10	22.35
Kokomo	19.25	20.25	21.75	22.25	22.50	22.75
Duluth	19.00	20.00	21.50	22.00	22.25	22.50
Kansas City, Mo.	17.00	18.00	19.50	20.00	20.25	20.50
St. Louis	18.50	19.50	21.00	21.50	21.75	22.00
Birmingham	18.00	19.00	20.50	21.00	21.25	21.50
Los Angeles, San Francisco	18.00	19.00	20.50	21.00	21.25	21.50
Seattle	15.50	16.50	18.00	18.50	18.75	19.00

CAST IRON SCRAP OTHER THAN RAILROAD

(Shipping point prices in gross tons)

	Group A	Group B	Group C
No. 1 Cupola Cast	$18.00	$19.00	$20.00
No. 1 Machinery Cast, Drop Broken, 150 lbs. & Under	18.00	19.00	20.00
Clean Auto Cast	18.00	19.00	20.00
Stove Plate	17.00	18.00	19.00
Unstripped Motor Blocks	17.50	18.50	19.50
Heavy Breakable Cast	15.50	16.50	17.50
Charging Box Size Cast	17.00	18.00	19.00
Miscellaneous Malleable	20.00	21.00	22.00

Group A includes the states of Montana, Idaho, Wyoming, Nevada, Utah, Arizona and New Mexico.

Group B includes the states of North Dakota, South Dakota, Nebraska, Colorado, Kansas, Oklahoma, Texas and Florida.

Group C includes states not named in groups A and B, plus Kansas City, Kans.-Mo.

*Open Hearth Grades refer to No. 1 heavy melting steel, No. 1 hydraulic compressed black sheet scrap, No. 2 heavy melting steel, dealers' No. 1 bundles, dealers' No. 2 bundles and No. 1 busheling. Blast Furnace Grades refer to mixed borings and turnings, shoveling turnings, No. 2 busheling and cast iron borings. Add $5 for chemical borings.

A basing point includes the switching district of the city named. The Pittsburgh basing point includes the switching districts of Bessemer, Homestead, Duquesne, Munhall and McKeesport, Pa. Cincinnati basing point includes the switching district of Newport, Ky. St. Louis basing point includes the switching districts of Granite City, East St. Louis and Madison, Ill. San Francisco basing point includes the switching districts of South San Francisco, Niles and Oakland, Calif.

Inferior Grades: Maximum prices of inferior grades shall continue to bear the same differential below the corresponding listed grades as existed from Sept. 1, 1940, to Jan. 31, 1941. No premium allowed on grades considered superior, unless approved by OPA. Addition of special preparation charges prohibited. Purchase of electric furnace or foundry grades for open hearth or blast furnace use permitted only at no more than price for corresponding open hearth grade. Exceptions: Low phos. billet, bloom and forge crops and electric furnace bundles may exceed open hearth price, and electric furnace bundles may exceed blast furnace price, if material is delivered to the consumer direct from the original industrial producer.

Commissions: No commission is payable except by a consumer to a broker for services rendered, the commission not to exceed 50 cents per gross ton. No commission is payable unless: The broker guarantees the quality and delivery of an agreed tonnage the scrap is purchased at a price no higher than the maximum allowed; the broker sells the scrap to the consumer at the same price at which he purchased it; the broker does not split the commission with the seller of the scrap, with another broker or sub-broker, or with the consumer. Commissions must be shown as separate item on invoice.

Maximum Shipping Point Price: Where shipment to consumer is by rail, vessel or combination of both, scrap is at its shipping point when it has been placed f.o.b. railroad car or f.a.s. vessel. In such cases, maximum shipping point prices are: (1) For shipping points located within a basing point, the price listed in the above table for scrap at the basing point in which the shipping point is located, minus the lowest established switching charge for scrap within the basing point; and (2) for shipping points located outside a basing point, the price in the above table for scrap at the most favorable basing point, minus the lowest transportation charge by rail, water or combination thereof. When vessel movement is involved, dock charges shall be 50 cents at Memphis, $1 at Great Lakes ports, $1.25 at New England ports, 75 cents elsewhere. New England shipping point prices computed on most favorable basing point prices; maximum transportation charge on scrap from New England, $6.65 per ton.

Scrap shipped by motor vehicle is at its shipping point when loaded. For shipping points within basing points, maximum is price listed in table minus lowest switching charge. When outside basing point, maximum is price at most favorable basing point minus lowest established charge when hauled by common carrier. When hauled by seller charges are based on carload rate for rail shipment, minimum $1.00 per ton.

Maximum Delivered Prices: Determined by adding established transportation charges to shipping point price, not to exceed by more than $1 (plus freight rate increase March 18, 1942) the prices listed in the table for the nearest basing point. Certain exceptions specified in Revised Price Schedule No. 4 (Amendment 1) apply to St. Louis district consumers, to WPB allocations, to water shipments from Duluth or Superior, Wis., to shipments of billets, blooms and forge crops from Pittsburgh and to shipments of electric and foundry grades from Michigan; to shipments of turnings to ferroalloy producers and of borings to chemical users. Delivered prices of scrap shipped under WPB allocations may exceed prices at nearest basing point by more than $1, provided most economical transportation is used.

Unprepared Scrap: Above prices are for prepared scrap. Maximum prices for unprepared scrap are $2.50 less than for the corresponding grades of prepared scrap, except for heavy breakable cast. In no case shall electric furnace and foundry grades be used as the "corresponding grade or grades of prepared scrap." Graveyard autos not considered unprepared scrap.

Remote Scrap: Consists of all grades, except railroad scrap, located in Florida, Montana, Idaho, Wyoming, Nevada, Arizona, New Mexico, Texas, Oklahoma, Oregon, Washington and Utah. Delivered price may exceed by not more than $5 the price at the basing point nearest consumer's plant, provided sworn details furnished OPA. Permission required to exceed by more than $5 the nearest basing point price. Colorado scrap is remote scrap for Colorado consumers only.

Sheets, Strip

Sheet Strip Prices, Page 122

About 10,000 tons of sheets for the navy has been distributed, in addition to heavier buying by private shipbuilders and direct yard purchases by supply officers of navy yards. Sheet production is suffering from larger plate production on strip mills but deliveries, especially on cold-rolled, are possible on rated orders in the A-1 classifications in four to six weeks. Alloys, confined almost entirely to top priorities, are more extended.

Narrow cold-rolled strip production is closely geared to spot supplies of hot-rolled strip. The latter is subject to primary melting schedules, which means control all along the line, limited to A-1-k rating or better. The same trend applies increasingly to high and low carbon cold-rolled strip. Some hot strip is obtainable at A-3 rating and much of the new tonnage is in the A-1 group. Rerollers have about worked off tonnage in their inventories. Bookings of high-rated volume are heavy but for war goods numerous new fabricators await installation of equipment before entering high consumption. Large tonnages of cold strip are being directly allocated, notably for lend-lease.

Plates

Plate Prices, Page 123

Plate allocations, making best use of production, with large tonnages from strip mills, have eased the situation somewhat but orders still exceed production. April output is estimated at 850,000 tons but this will fill only about 75 per cent of demand for that month. It is not clear that plate fabricators, including shipbuilders, tank builders and other war manufacturers, can actually use more than the 850,000 tons. It seems possible buying is running ahead of ability to consume.

WPB has asked all plate users to reduce inventories to a minimum before ordering further, on the assumption that some tonnage is being allocated that could be delayed somewhat. Army, Navy and Maritime Commission are cooperating in this effort and are filing regular reports on inventories and rate of consumption. Industry is also reporting voluntarily and closer co-operation is being asked.

Tonnage accumulates on mill books in A-1-a rating to the point where aid is asked of WPB for allocating. Heavy orders for floor plates for direct shipment for the Navy and private shipyards will mean light deliveries to warehouses.

In spite of heavy rejections last month of tonnage for April rolling, platemakers report current applications for May appear equally large. A feature of this month's schedule is greater allowance for plates for high-test gasoline refineries and for facilities for manufacture of synthetic rubber. A special quality of sheared plates is required and while ship requirements still predominate, more sheared plates will be provided for these other needs.

PLATE CONTRACTS PLACED

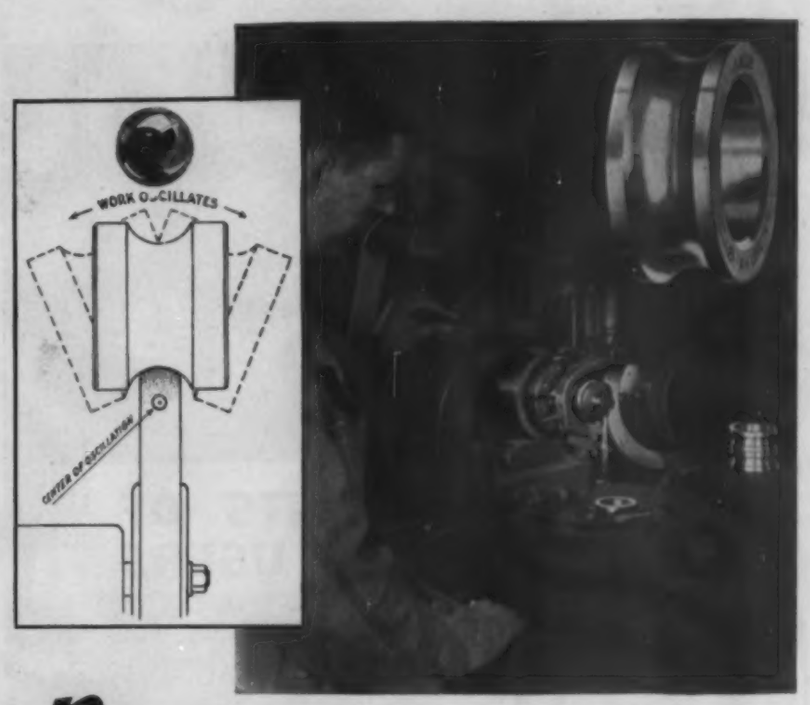
Unstated tonnage, conveyor barge for removing water hyacinths, United States engineer, New Orleans, to Orleans Materials & Equipment Co., New Orleans, $22,933, pro. 296.

Bars

Bar Prices, Page 122

Bar requirements, especially in alloy grades, are reflected in heavier buying, closely approaching over a broader assortment. Late May delivery is promised by some makers on A-1-a shipments but deliveries tend to be more extended as volume of high priorities accumulates. Bessemer deliveries are slightly better than open hearth, but as more consumers turn to the former the advantage is lessening.

Foreign makers are operating at capacity and require heavy bar tonnages. Farm implement makers, large bar users, are nearing the end of their 1942 production and are tooling for armament work. This is particularly true of tractors, for which schedules were pushed ahead beyond quotas by government permission, to speed preparation for production of tanks and other military equipment. Difficulty of obtaining steel has been such that some lines of implements



Perfection IN THE GROOVE

RACEWAY GRINDING in CJB Bearings is done with the most modern oscillating grinders.

Steel Balls accurate in sphericity to .000025 can perform best only when the raceway in which they travel matches them in accuracy... note diagram.

The arc in CJB Ball Bearing raceways is made micromatically accurate to match the steel balls by automatic oscillating grinders.

By this method the raceway oscillates transversely across the face of the grinding wheel, as illustrated above, consequently there can be no errors in contour. That's why CJB Ball Bearings last longer.

AHLBERG BEARING COMPANY

CJB AHLBERG ★ 3015 WEST 47th STREET • CHICAGO, ILL. ★

have been discontinued or deeply curtailed. Unless allocations are made it seems probable quotas will not be reached.

Approximately 11,000 tons of cold-drawn bars has been placed recently in the East by two manufacturers of shells for the Navy. Most of the tonnage is in 1⅝-inch bars for 40-mm. shells and the remainder small bars for 20-mm. shells.

Pipe

Pipe Prices, Page 123

Merchant pipe deliveries are extending steadily. With high preference tonnage having first call on ingots pipemakers have difficulty in obtaining semifinished supply. In butt-weld pipe, using bessemer steel, the situation is not bad but in lap-weld, using open-hearth steel, delivery promises are difficult to obtain.

Demand for lap-weld for industrial building and miscellaneous government requirements is brisk. Curtailment in building has cut down sales of small diameter pipe and slight shading is met occasionally. Except for government housing projects few large construction jobs are pending. Tubing in small lots is scarce, mills being heavily booked on large direct-rated volume. Shipbuilding requirements are active for both pipe and tubing.

FIRST IN WAR
FIRST IN PEACE
FIRST
IN THE PLANTS OF
OVER 1400 USERS
REPEAT USERS
NO. OF MACHINES
General Motors Corp. 52
Ford Motor Co. 17
Curtiss-Wright Corp. 38
International Harvester Co., Inc. 34
Firestone Tire & Rubber Co. 23
General Electric Co. 21
Timken Corporation 18
Natl. Mall. & Steel Castings Co. 18
Chrysler Corp. 18
Magnus Metal Div. 17
Borg-Warner Corp. 14
Campbell, Wyant & Cannon Fdy. Co. 12
Eastern Mall. Iron Corp. 11
Eaton Mfg. Co. 11
Kelsey Hayes Wheel Co. 11
U. S. Government 11
Associated Spring Corp. 10
Bendix Aviation Corp. 10
Spicer Mfg. Corp. 10
Wyman-Gordon Co. 9
Amtorg Trading Corp. 8
American Brake Shoe & Fdry. 8
Allis-Chalmers Mfg. Co. 7
Gunn Company 6
Bethlehem Steel Corp. 6
Thompson Aircraft Prod. Co. 6
Fedders Mfg. Co. 6
Belle City Mall. Iron Co. 5
General Motors Corp. 5
Nallstead Iron Fdry. 5
Auto Specialties Mfg. Co. 5
Studebaker Corp. 5
and 146 other plants have from 2 to 5 Machines each.
General Forrest—"the Fox" of Civil War fame—gave this prescription for winning battles: "Get there furstest with the mos' men." And it worked! Today he would be the first to modernize his famous slogan by including the crushing power of "mechanized equipment."
To get this equipment to our theatres of war quickly and in large quantities is the tremendous problem of the moment. Nothing must delay—even the slightest—the constant stream of material to our fighting forces.
In war, as in peace, the airless WHEELABRATOR is saving precious minutes and hours for hundreds of plants producing shells, bombs, tanks, airplane engines, guns, armament and other vital war necessities.
But it goes even further than saving time in this important work: It improves machinability and grinding—it lengthens tool and cutter life—it simplifies inspection—it conserves power, space and labor—it is a cost-saver in every respect.
WHEELABRATOR Airless ABRASIVE BLAST EQUIPMENT
AMERICAN
FOUNDRY EQUIPMENT CO.
509 S. Byrkit Street Mishawaka, Ind.

CAST PIPE PLACED

100 tons, Panama sch. 5958, to American Cast Iron Pipe Co., Birmingham.

CAST PIPE PENDING

383 tons, 8-inch, San Francisco; bids April 10.

250 tons or more, 12,900 feet, 6 and 8-inch, also 38 valves and two tons fittings; bids in to C. A. McCabe, city clerk, Pomeroy, Wash., March 24.

250 tons or more, 6 and 8-inch, 28 hydrants, 73 manholes; bids to F. C. McKenzie, mayor, Hermiston, Oreg., April 6; R. H. Corey, Portland, Oreg., engineer.

190 tons, 6 and 8-inch, Hermiston, Oreg.; bids April 6.

STEEL PIPE PENDING

127 tons, copper-nickel alloy condenser tubes, navy, schedule 688, east and west yards, Revere Copper & Brass Co., Baltimore, low 42.75c and 43.95c, delivered, or 42.10c, f.o.b. for west yard.

Rails, Cars

Track Material Prices, Page 123

Domestic freight car awards in March dropped to 4080 units, compared with 11,725 in February. For first quarter total car orders were 20,058, against 28,741 in the comparable period last year. Detailed comparisons are as follows:

	1942	1941	1940	1939
Jan.	4,253	15,169	360	3
Feb.	11,725	5,508	1,147	2,259
March	4,080	8,074	3,104	800
3 mos.	20,058	28,741	4,611	3,062
April		14,645	2,077	3,095
May		18,630	2,010	2,051
June		32,749	7,475	1,324
July		6,459	5,846	110
Aug.		2,668	7,525	2,814
Sept.		4,470	9,735	23,000
Oct.		2,499	12,195	19,634
Nov.		2,222	8,234	2,650
Dec.		8,406	7,181	35
Total		121,499	66,889	57,775

April has started with award of 2000 ore cars by Duluth, Missabe & Iron Range and inquiry by the Great Northern for 1000 ore cars. Other inquiries now active indicate a larger total in April than in March.

CAR ORDERS PLACED

Chicago, Rock Island & Pacific, 25 seventy-ton covered hopper cars, to General American Transportation Corp., Chicago.

Duluth Missabe & Iron Range, 2000 seventy-five ton ore cars, distributed equally among the Pullman-Standard Car Mfg. Co., Chicago; Pressed Steel Car Co., Pittsburgh; American Car & Foundry Co., New York; and General American Transportation Corp., Chicago.

Nashville, Chattanooga & St. Louis, 75 seventy-ton gondolas, to Greenville Steel Car Co., Greenville, Pa.

National Railways of Mexico, 970 freight cars and 20 baggage express cars, 500 fifty-ton box cars, 200 fifty-ton gondola cars and 70 thirty-cubic yard air dump cars and the 20 baggage express cars, all going to Magor Car Corp., Passaic, N. J., and 200 fifty-ton tank cars to American Car & Foundry Co., New York.

Navy, five 135-ton armored deck cars, to Haffner-Thrall Car Co., Pittsburgh.

War Department, 500 eight wheel 30-ton freight cars, comprising 350 box cars,

120 gondola cars and 30 flat cars, to Magor Car Corp., Passaic, N. J.

CAR ORDERS PENDING

Great Northern, 1000 seventy-five-ton ore cars; bids asked.

Rosoff Panama Construction Co., 36 fifty-ton flat cars and 4 seventy-ton gondola cars, bids asked.

LOCOMOTIVES PLACED

Boston & Maine, three 1000-horsepower diesel-electric switch engines, to Electro-Motive Corp., La Grange, Ill.

LOCOMOTIVES PENDING

Argentina State Railways, three 2-10-4 type steam locomotives, pending; these are in addition to 10 to 15 4-6-2 type locomotives previously noted.

Duluth, Missabe & Iron Range, ten 2-8-8-4 type steam locomotives, bids asked.

RAIL CONTRACTS PENDING

1050 tons, United States engineer, Pittsburgh; bids April 11.

Structural Shapes

Structural Shape Prices, Page 123

Structural shape demand contains little outside of government requirements and private construction has dropped to practically nothing. Fabricators have much work on books and indications are a number of projects now in the engineering stage will be out for bids soon.

Need for steel piling is increasing and mills are slow to promise delivery as some requirements are for large tonnages at high priority. In some cases deliveries below A-1-c are almost impossible.

SHAPE CONTRACTS PLACED

27,826 tons, gates, valves and bulkheads, engineering project, also 4095 tons of steel castings; 1334 tons of steel forgings; 243 tons of steel pipe, and 196 tons of copper, nickel and brass products, to Treadwell Construction Co., Midland, Pa., $16,007,498.40; negotiated contract, bids March 3.

5000 tons, shipyard, Dravo Corp., at eastern point, to Bethlehem Steel Co., Bethlehem, Pa.

2000 tons, explosives plant, Pennsylvania, to Wisconsin Bridge & Iron Co., Milwaukee, through Stone & Webster Engineering Corp., Boston.

1530 tons, plant expansion, Lukens Steel Co., Coatesville, Pa.; 1200 tons to Welded Steel Shapes Inc., Coatesville, 330 tons to Riverside Bridge Co., Martins Ferry, W. Va.

1100 tons, addition, American Forge Co., Berkeley, Calif., to Judson-Pacific Co., San Francisco.

1000 tons, addition to foundry, Pacific Car & Foundry Co., Seattle, Wash., to Judson-Pacific Co., San Francisco.

1000 tons, racks, eastern navy yard, to Robinson Steel Co., Philadelphia, through Dry Dock Associates, New York.

925 tons, buildings and facilities, shipyard, to Harris Structural Steel Co., New York; Caye Construction Co., New York, contractor.

700 tons, crane runways, eastern navy yard, to American Bridge Co., Pittsburgh.

668 tons, Salinas River bridge, California, to Columbia Steel Co., San Francisco.

500 tons, machine and pipe shop, Moore Dry Dock Co., Oakland, Calif., to Judson-Pacific Co., San Francisco.

486 tons, piling, new shipways, Jeffersonville Boat Co., Jeffersonville, Ind.; 370 tons to Inland Steel Co., Chicago, and 116 to Bethlehem Steel Co., Bethlehem, Pa.; Henry Bickel Co., Jeffersonville, Ind., contractor.

350 tons, shop addition, A. O. Smith Corp., Milwaukee, to Wisconsin Bridge & Iron Co., Milwaukee; Garrick Construction Co., Chicago, contractor.

300 tons, pressure chamber building, eastern navy yard, to Bethlehem Fabricators Inc., Bethlehem, Pa., through Thomas F. Gibson, Philadelphia.

250 tons, cold storage building, Floyd Bennett Field, New York, to Lehigh Structural Steel Co., Allentown, Pa.

200 tons, alterations, Link-Belt Co., Chicago, to A. F. Anderson Iron Works, Chicago; Algot B. Larson, Chicago, contractor.

200 tons, steel sheet piling, Floyd Bennett Field, New York, to Bethlehem Steel Co., Bethlehem, Pa.

158 tons, bridge No. 18, Arlington, Va., to American Bridge Co., Pittsburgh, through L. J. Rice Co., New York.

100 tons or more, total requirements undetermined, air base facilities, Kansas, to Kansas City Structural Steel Co., Kansas City, Mo.; reinforcing bars

SHAPE AWARDS COMPARED

	Tons
Week ended April 4	44,693
Week ended March 28	27,510
Week ended March 21	19,968
This week, 1941	26,214
Weekly average, 1942	23,688
Weekly average, 1941	27,373
Weekly average, March, 1942	18,011
Total, 1941	418,505
Total, 1942	307,941

Includes awards of 100 tons or more.

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to Truscon Steel Co., Youngstown, O., through Svenson Construction Co., Kansas City, Mo.

100 tons or more, jib cranes, marine railways, naval submarine bases, to Lakeside Bridge & Steel Co., Milwaukee, $300,430, spec. 10593, Bureau of Yards and Docks, Navy Dept.

100 tons or more, caissons, dry docks, navy yard, to Dravo Corp., Pittsburgh, $370,665, Bureau of Yards and Docks, Navy Dept. spec. 10498 and 10682.

100 tons or more, one 50-ton dry dock crane, Terminal Island, Calif., to Star Iron & Steel Co., Tacoma, Wash., $250,000; one crane, Vieques, P. R., to Derrick & Hoist Construction Co., New York, $204,625.50, Bureau of Yards and Docks, Navy Dept.

100 tons, additional facilities, dry dock supplemental contract, to A. O. Wilson Structural Co., Cambridge, Mass., and Consolidated Iron Works, Boston; Morton C. Tuttle Co., Boston, contractor; Truscon Steel Co., South Boston, awarded 45 tons, concrete reinforcing bars.

SHAPE CONTRACTS PENDING

26,000 tons, airplane engine plant, Chicago, to be operated by Chrysler Corp.; Albert Kahn, Detroit, engineer; bids April 6.

2000 tons, oil cracking plants, New Orleans and Texas, E. B. Badger & Sons Co., Boston, contractors.

2000 tons, buildings, eastern navy yard, to Sanders Engineering Co., Portland, Me.; in addition to 1000 tons tentatively placed by same contractor for all-welded building at same point.

1100 tons, oil cracking plant, Pennsylvania; E. B. Badger & Sons Co., Boston, contractor.

1100 tons, bridge, Fayette and Somerset counties, Pennsylvania; bids to state highway department, Harrisburg, Pa., April 10.

1050 tons, synthetic rubber plant; E. B. Badger & Sons Co., Boston, contractor.

750 tons, tidal basin bridge, Washington; bids April 24 to District of Columbia government.

680 tons, transmission towers, Virginia Electric & Power Co., Stone & Webster Engineering Corp., Boston, contractor.

435 tons, I-beam bridge, Philadelphia county, Pennsylvania; bids to state highway department, Harrisburg, Pa., April 10.

180 tons, two river crossing towers, Montaup Electric Co., Fall River, Mass.; Stone & Webster Engineering Corp., Boston, contractor.

Unstated, Washington state highway bridge, Coweeman river, near Kelso; bids soon.

Unstated, Washington state highway bridge, 665 feet overall, over Portage Canal, near Port Townsend; bids soon to Olympia, Wash.

Unstated, 35-mile, 230-kv. steel tower transmission line No. 3, Bonneville to Vancouver, Wash.; bids to Bonneville Power Administration, Portland, Oreg., April 6; No. 2703.

GOVERNMENT Engineers are enthusiastically receptive to ideas that will save copper, aluminum, steel—for planes, tanks, and ships to carry our boys to victory! All America is anxious to save man-hours, money, and materials that are so vital to win. The Dravo Heater makes possible such savings.

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HEATER DEPARTMENT
DRAVO BUILDING • PITTSBURGH, PA.
Sales Offices in Principal Cities

Reinforcing Bars

Reinforcing Bar Prices, Page 123

With current inquiries for reinforcing steel confined entirely to war plant construction, and carrying top priority ratings, bar producers and suppliers are narrowing the range of ratings which can be handled. Few mills can go below A-1 in their rolling schedules. Small jobbers, who have supplied steel to start jobs in A-2 and below, now encounter difficulty in obtaining material to complete construction. Opinion is that the situation will tighten.

REINFORCING STEEL AWARDS

5000 tons, ordnance plant, Illinois, to be operated by Johnson Ordnance Corp., 2500 tons to Bethlehem Steel Co., Bethlehem, Pa., and 2500 tons to Carnegie-Illinois Steel Corp., Chicago; Bates & Rogers Construction Corp., Chicago, contractor.

750 tons, plant addition, General Cable Co., St. Louis, to Laclede Steel Co., St. Louis; George A. Fuller Co., Chicago, contractor.

450 tons, radio tube plant, Radio Corp. of America, Lancaster, Pa., to Bethlehem Steel Co., Bethlehem, Pa.

350 tons, army construction, Ohio, to Pollak Steel Co., Cincinnati; Owen-Ames & Kimball Co., Grand Rapids, Mich., contractor.

REINFORCING STEEL PENDING

2750 tons, Bureau of Reclamation, Denver; bids April 7.

2300 tons, United States engineer, Denni-

CONCRETE BARS COMPARED

	Tons
Week ended April 4	6,550
Week ended March 28	7,180
Week ended March 21	7,262
This week, 1941	13,940
Weekly average, 1942	7,953
Weekly average, 1941	13,609
Weekly average, March, 1942	9,201
Total, 1941	147,446
Total, 1942	103,385

Includes awards of 100 tons or more.

son, Tex., inv. 134; bids in.

1500 tons, ordnance works, Illinois, Stewart-Warner Corp. to operate, J. L. Simmons, Springfield, Ill., contractor; bids April 1.

1000 tons, ordnance works, Indiana, E. I. du Pont de Nemours & Co., to operate; bids asked.

1000 tons, two housing projects, Boston; John Bowen Co., Boston, low on South End units, $1,640,600; Daniel Cunningham Construction Co., Boston, low on Charlestown, $271,400; also housing project, Hartford, Conn., Melton Court extension, Michael A. Connor Co., Hartford, low $723,909.

750 tons, Panama, sch. 6087; bids April 8.

650 tons, bridge, Fayette and Somerset counties, Pennsylvania; bids to state highway department, Harrisburg, Pa., April 10.

650 tons, power house, Meredosia, Ill., for Central Illinois Public Service Co.; Sargent & Lundy, Chicago, engineers; bids April 2.

110 tons, bridge and approaches, access road project, Hull, Mass.; Berke-Moore Co., contractor, $103,420.50.

Pig Iron

Pig Iron Prices, Page 124

April pig iron allocations reflect increasing war production by foundries. Steel foundries are crowded. Among iron foundries high-pressure pipe producers have substantial bookings of high-priority work and jobbing foundries have increasing volume, requirements for machine tool castings being heavy. Foundries engaged in manufacturing sanitary ware and other specialties have difficulty in converting to war work and are concerned over pig iron supply.

Some melters have been refused tonnage for April delivery, inventory reports showing their supply sufficient for essential needs. Some foundries were allowed larger tonnage because of increased war contracts.

Test smelting of Missouri iron ore has been undertaken by Granite City Pig Iron Co., Granite City, Ill., now operated by Koppers United Co., Pittsburgh, to ascertain if extensive use is practicable to increase pig iron supply. Some of this ore was used during the previous war. The ore occurs in pockets instead of veins or large deposits. Mines at Iron Mountain, Mo., have yielded considerable ore but have not been operated since 1926.

Two blast furnace stacks in the Chicago district, which have been idle for several years, are to be dismantled and moved to new locations. One will be re-erected in a northern location. It has capacity for about 700 tons of iron per day. The other will be moved to the West and remodeled to capacity of 800 to 1100 tons per day. Defense Plant Corp. is financing the move.

Scrap

Scrap Prices, Page 126

Scrap supply holds the improvement of the past ten days and steelmakers are receiving better tonnage in most districts. The larger supply shows the effect of intensive drives for dormant tonnage in various locations and will continue until these are exhausted. A campaign is getting under way to gather scrap materials in oil refineries and about oil wells in the West and Southwest.

Some allocations continue to be made in the effort to distribute tonnage to best advantage for war production of steel and some mills have asked for preferential treatment, as their reserves have been drawn down to the danger point. Better supply has made possible further additions to steelmaking capacity in some areas. Foundries continue to find cast grades difficult to obtain in sufficient volume though steel scrap is in better supply.

In the Buffalo area conditions have improved greatly and shipments by lake from the North are expected to arrive shortly, now that navigation has opened.

OPA Amends Rules on Special Scrap Grades

Office of Price Administration has issued an amendment to revised price schedule No. 4, effective March 31, making a uniform premium for cast iron borings for chemical use of $5 per ton over

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● Outstanding production records for Jessop CNS include an average of 125,000 pieces on dies forming conduit boxes from 14-15 gauge hot rolled sheets. Previous use of regular oil hardened steel resulted in an average of only 50,000 pieces.

The balanced analysis of CNS gives it maximum hardness with good toughness. Resistance to corrosion is another inherent characteristic. It can be oil hardened or air hardened, as desired. Check the list below of typical CNS applications. No doubt, you too will find CNS the answer to many of your tool and die problems where long production runs are required.

TYPICAL APPLICATIONS OF CNS DIE STEEL

Dies for coining, crimping, cutting, drawing, extruding, forming, hobbing, punching, slotting, stamping, thread-rolling, trimming and general blanking work; Adjustable Reamer Blades; Broaches; Burnishing Tools; Bushings; Cutters; Drill Plugs; Hobs; Plug and Ring Gauges; Punches; Reamers and Sand-Blast Nozzles; Edging, Spindle and Guide Tools; Spinning Tools; Forming and Seaming Tools; Swedges; Taps; and Brass-turning Tools.

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borings for other use. This replaces a premium of $3 for chemical use and $5 for chemical use in manufacture of explosives.

It also provides a new premium of $7 per gross ton above the price of No. 1 heavy melting steel on high-manganese steel scrap for electric furnace use only. This is intended to induce segregation of high-manganese steel to conserve the manganese content. Two specific differentials are established for briquettes. Those made of machine shop or shoveling turnings have a premium of $4 over the same materials unbriquetted and briquettes of mixed borings and turnings or cast iron borings have a premium of $3.

Railroad steel axles sold exclusively for rerolling or reforging are priced $6 per ton over No. 1 heavy melting steel. Railroad steel wheels and steel springs sold exclusively for electric, acid open hearth or foundry use are $3.50 over No. 1 heavy melting steel. Knuckles and couplers for the same use are $3 over No. 1 steel. Railroad brake shoes shipped from dealer's yards have a specific differential of $4.75 under No. 1 cupola cast scrap.

Railroads which sell unprepared scrap direct to consumers or their brokers must price such scrap $3.50 below prepared scrap. This does not affect certain specific unprepared grades for which railroads filed average prices and for which OPA authorized maximum prices.

Further restrictions are placed on provisions governing mixed shipments of all grades, steel, cast or steel and cast. If provisions are not met the shipment must be priced at $2.50 below the maximum applicable to the lowest-priced grade in the shipment.

Warehouse

Warehouse Prices, Page 125

OPA has issued an amendment to price schedule No. 49, covering warehouse sales of steel and iron, affecting export sales. Inventories acquired prior to Dec. 15, 1941, date of the original order, may be sold in the export market at regular ceiling price, plus charge for storage, demurrage and similar items, accumulated because of failure to obtain shipping space, with the same commissions allowed as in the original order. This applies especially to distress or stranded material destined for export for which shipping was unavailable or which were turned back to Pacific ports after Dec. 7 and unloaded. This clause expires July 1, 1942, after which regular ceilings apply.

It also is provided that export shipments may be made at prices above the ceiling when the Board of Economic Welfare certifies that a higher price is necessary for considerations of political or military necessity or because of the necessities of economic warfare.

Pacific Coast

San Francisco — Plate awards last week aggregated 184,017 tons, principally for shipbuilding, bringing the total for the year far above that of the corresponding period last year. The Maritime Commission has awarded 72 additional Liberty ships.

Structural lettings ran to 60,618 tons, bringing the total for three months to 461,453 tons, compared with 152,960 tons in first quarter last year. Defense projects continue to call for most of the tonnage. Largest projects were an addition for American Forge Co., Berkeley, Calif., a foundry addition at Seattle and a bridge over Salinas river in California.

Reinforcing bar awards were in lots of less than 100 tons and the aggregate was low, though a heavy tonnage is being delivered for defense projects. In three months this year 14,526 tons have been placed, compared with 21,545 tons in the same period in 1940.

Government work is calling for large tonnages of cast iron pipe and little private inquiry is coming out. Total sales this year have been 2963 tons, compared with 11,225 tons a year ago.

Seattle—Major construction projects in Washington and Oregon are being supervised by United States engineers at Seattle and Portland. These jobs are military secrets but they are of large extent and importance. Quantities

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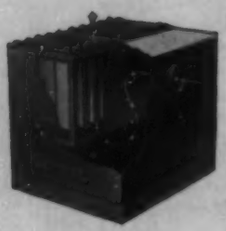
Standard Type D Roto-Clone combined exhauster and dust separator. Write for engineering data and Bulletin No. 272.



The Airmat Dust Arrester is designed for the collection of fibrous and flaky dusts. Available in all sizes to meet any air volume requirement. Bulletin No. 380.

Thirty-three AAF dust control installations protect grinding, buffing and polishing in the Lycoming motors plant. Equipment installed includes Roto-Clone Standard Type D units for belt polishers and grinders in the tool room, Self-Contained Roto-Clones with after cleaners serving Kellerflex grinders throughout the assembly floor, and Airmat Dust Arresters serving buffing operations for finishing connecting rods, master rods, crank shafts, cylinder heads and propeller hubs. There's an AAF product designed for every dust control need. Write for descriptive bulletins. Address 443 Central Avenue. Canadian Company's Address: Darling Bros., Ltd., Montreal, P.Q.

AMERICAN AIR FILTER COMPANY, INC., LOUISVILLE, KY.

are unstated. The Seattle office will open bids April 3, 6, 9 and 11 for various warehouses and buildings.

Bids are in at Tacoma for the second Nisqually power plant project, involving 2500 tons of shapes and unstated tonnages of plates, reinforcing and other materials, including circuit breakers for La-Grande and Alder stations.

Plans are out for a large housing project, 5000 units at Vancouver, Wash., to cost $18,500,000 and covering 981 acres. This job includes a heavy tonnage of water mains and other facilities. Parker & Hill, Seattle engineers, are preparing plans for water and sewer projects at various points adjacent to Seattle, totaling about $1,000,000, including disposal plants and other improvements. Tonnages are not stated. Bids will be received at Hermiston, Ore., April 6, for about 250 tons of 6 and 8-inch cast iron pipe and accessories. Pomeroy, Wash., is studying figures for furnishing 250 tons of 6 and 8-inch cast iron pipe and fittings.

Pig iron is extremely scarce, Provo being out of the market and limited supplies coming from eastern sources. Foundries report insufficient material although conditions vary at different plants, some having fair stocks while others are practically bare. Coke is available in any tonnages desired, no priorities affecting this market. Fernie, B. C., is supplying about 25 per cent of the demand from this area, the remainder coming from eastern ovens.

Canada

Toronto, Ont.—Under strict priority control and almost total suspension of non-essential civilian production war industries are not receiving sufficient steel to enable full production activities. Steel mills are maintaining capacity production with practically all output directed to war materials. Despite the many complications there have been improvements in shipments recently which have enabled a number of companies to speed up war production. Also it is reported that deliveries of steel from the United States are reaching this country in larger volume.

Production and supply of plates, while about 30 per cent greater than at the beginning of the year, still is far below requirements. All plate production is under direct control of the government, and no supplies are available to non-war industry. Shipbuilding and war tank construction are taking most of the output and only small quantities are going to rolling stock builders. While there seems to be some secrecy regarding placing of additional rolling stock orders in Canada by the Canadian National and Canadian Pacific Railways, it has been reported in reliable quarters that large contracts are pending. Canadian car builders still have large orders to complete that were taken in 1941. Canadian Car & Foundry Co., Montreal, is reported to have closed an order totaling about $2,000,000. Arrangements are proceeding for greater production of tanks in Canada and it is stated that General Motors may participate in a big way. No improvement is reported in supply of sheets and strip, only orders approved by the government being accepted.

Metallurgical Coke

Coke Prices, Page 123

Partial easing of the tight situation in beehive furnace coke is seen in the announcement of H. C. Frick Coke Co., United States Steel Corp. subsidiary, that it is preparing to open operations in the Leisenring field, near Uniontown.

Coal in this field is a high grade metallurgical material, and estimated size of the deposit is 50 million tons. Two pits are expected to start operation shortly, employing about 1500 men and bringing out an estimated total of 10,000 tons daily.

While there is no indication that this coal will be available to independent beehive oven operators, it is evident that it will augment the supply now available to the Frick company, which is the largest single buyer of beehive coke. Approximately 500 ovens are being rehabilitated adjacent to the Leisen-

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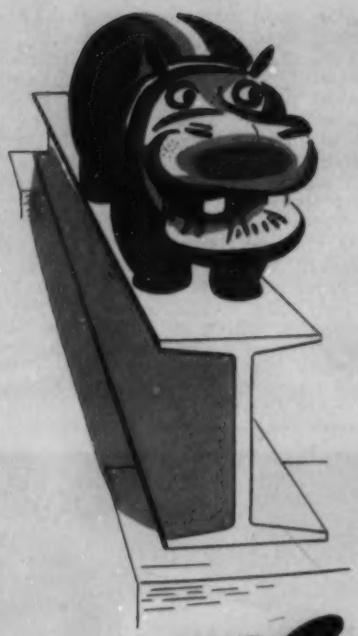

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J-21299

WESTINGHOUSE

SEE PAGE 92 AND PAGE 93

ring mines, where a part of the coal can be coked.

Coke oven expansion under WPB is ahead of schedule. The program calls for 1713 new ovens, which will be completed by the end of 1943, 435 to be in operation by the end of this year. Koppers Co. is working on eight batteries.

Iron Ore

Iron Ore Prices, Page 125

First cargo of iron ore from the upper lakes was loaded March 24 and reached docks at Cleveland March 28, the earliest date for opening of the ore season in history. This is 12 days earlier than the record of April 9, made last year. The cargo was carried by the J. H. SHEADLE of the Cleveland-Cliffs fleet, and consisted of about 10,000 tons for Republic Steel Corp.

For the first time in history March became an important ore-carrying month, 792,558 tons of ore being loaded at upper lake ports. Lake Superior Iron Ore Association reports the following shipments for March:

Escanaba	76,284
Marquette	125,689
Ashland	29,217
Superior	316,756
Duluth	108,561
Two Harbors	136,051
Total	792,558

Provision has been made for armed coast guardsmen on all ore carriers passing through the Soo, and the Detroit, St. Clair and St. Marys rivers, and while entering and leaving harbors and lying at docks. It is planned to enroll six officers on each ship in the coast guard and arm them for duty to guard against sabotage.

Tin Plate

Tin Plate Prices, Page 123

A new list of standard black plate extras, dated April 1, has been issued by Carnegie-Illinois Steel Corp. to cover grades of black plate for untinned cans. Can-making quality takes an extra of 40 cents; for mill run a deduction of 10 cents; for primes only, add 25 cents; for chemical treatment add 60 cents. The list eliminates several grades included in the list of Nov. 28, 1939, and carries a table of coiling extras, based on 2500 pounds or over. Extra for full-finished cold-rolled plate is reduced from 50 to 40 cents.

Steel in Europe

Foreign Steel Prices, Page 125

London—(*By Cable*)—Steel market in Great Britain is active as orders are being placed for second quarter delivery. The position is satisfactory in pig iron except in hematite and low phosphorus. Output of semifinished steel is expanding. Demand continues heavy for special alloy steels. The domestic market for tin plate is active within present limitations.

A Story——

WE DARE NOT TELL!

The scene might be in the Western Plains Country, or it might be somewhere near sea water, but regardless of location, it is a story that can't be told now. Never have such water systems been constructed. The idea is entirely new and is of major importance to the armed forces.

One fact worthy of note is that Layne was called on to drill the wells, furnish and install the pumps and to fulfill other important missions. In record time, everything has gone through on schedule. The task, though entirely new and very complicated, was handled by Layne engineers as if their usual methods had been employed.

It is characteristic of Layne to meet and conquer unusual well water supply problems. Layne engineers are trained for unforeseen eventualities. To fulfill the requirements of the Government was difficult, but promptly and satisfactorily accomplished.

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Layne-Bowler New England Corp. ..... Boston, Mass.
International Water Supply, Ltd. ..... London, Ont.

WORLD'S LARGEST WATER DEVELOPERS

Nonferrous Metal Prices

Mar.	Copper: Electro, del. Conn.	Copper: Lake, del. Midwest	Copper: Casting, refinery	Straits Tin, New York: Spot	Straits Tin, New York: Futures	Lead N. Y.	Lead East St. L.	Zinc St. L.	Aluminum 99%	Antimony Amer. Spot, N.Y.	Nickel Cathodes
1-21	12.00	12.12½	11.75	52.00	52.00	6.50	6.35	8.25	15.00	14.00	35.00
22-31	12.00	12.12½	11.75	52.00	52.00	6.50	6.35	8.25	15.00	15.00	35.00
April 1-3	12.00	12.12½	11.75	52.00	52.00	6.50	6.35	8.25	15.00	15.00	35.00

F.o.b. mill base, cents per lb. except as specified. Copper brass products based on 12.00c Conn. copper

Sheets

Yellow brass (high)	19.48
Copper, hot rolled	20.37
Lead, cut to jobbers	9.75
Zinc, 100 lb. base	13.15

Tubes

High yellow brass	22.23
Seamless copper	21.37

Rods

High yellow brass	15.01
Copper, hot rolled	17.37

Anodes

Copper, untrimmed	18.12

Wire

Yellow brass (high)	19.73

OLD METALS

Dealers' Buying Prices
(In cents per pound, carlots.)

Copper

No. 1 heavy	9.50-10.00
Light	7.50- 8.00

Brass

No. 1 composition	9.00- 9.50
Light	6.00- 6.50
Heavy yellow	6.50- 7.00
Auto radiators	7.25- 7.75
Composition turnings	7.75- 8.25

Zinc

Old	5.25- 5.75
New clippings	6.75- 7.25

Aluminum

Clippings	10.50-11.00
Cast	10.00-10.50
Pistons	10.00-10.50
Sheet	10.00-10.50

Lead

Heavy	5.12½ -5.62½
Mixed babbitt	6.00- 7.00
Electrotype shells	5.00- 5.75
Stereotype, Linotype	6.50- 7.50

Tin and Alloys

Block tin pipe	45.00-47.00
No. 1 pewter	37.00-39.00
Solder joints	9.50-10.00

SECONDARY METALS

Brass ingot, 85-5-5-5, l.c.l.	13.25
Standard No. 12 aluminum	14.50

Nonferrous Metals

New York—Additional quantities of nonferrous metals will be diverted to war use as the result of further curbs placed by WPB on manufacture of civilian goods. Included among items to be affected by recent orders are burial equipment, household utensils, vacuum cleaners, zippers and collapsible tubes.

Copper—United States copper refineries operated only 84 per cent of their theoretical capacity in February, against 95 per cent in January. February refined copper production was 108,844 tons, against 123,594 in January, the decline being influenced by the shorter month.

Lead—April lead pool was set by WPB at 15 per cent of producers' February output. This percentage is the same as in March, and the tonnage to be earmarked will vary only slightly from that of last month.

Zinc—WPB has extended Order M-11, as expected, the new expiration date being May 31. By that time a revised zinc order is expected to be completed. The April pool has been set at 60 per cent of January production of high grade and special high grade zinc and 40 per cent of all other grades. No zinc oxide or dust is to be set aside.

Tin—Saving of 4400 tons of tin annually is expected to result from the WPB order limiting use of tin-coated and alloy collapsible tubes.

April Lead Pool Set at 15% of February Output

April lead pool has been set at 15 per cent of February production by WPB. Percentage is unchanged from last month and the amount to be set aside varies only slightly from recent months.

Use of Critical Materials in Fasteners Prohibited

WPB has prohibited use of copper and copper base alloy in the manufacture of slide fasteners, hooks and eyes, brassiere hooks, snap fasteners and grippers, and other garment closures. More than 8000 tons of copper were used in such products in 1941.

A YEAR AGO HE SHOUTED: "PAGE FOR WIRE"

Now he adds: "FOR AMERICA AT WAR"

• • • — **PAGE WIRE** for rifles, tanks, balloon barrages, airplane controls, mine sweepers, communication systems and for a host of other war equipment.

• • • — **PAGE WIRE**, in one form and another, for plants that produce equipment and materials vital to Victory.

Such demands drive production to capacity, slow deliveries, even on high priority ratings.

It might help your own deliveries of wire or wire products if you analyze your present uses of it.

For **SHAPED WIRE** use standard shapes, dimensions and analyses. Avoid special runs.

For **WELDING ELECTRODES** be sure to get electrodes of the correct analyses and sizes for the job—and of the most economical type. Check this carefully. Instruct your welders not to bend electrodes and to use them right down to the holder.

For **GENERAL WIRE**—Spring Wire, Bond Wire, Telephone Wire, etc.—adopt standard analyses, shapes and sizes.

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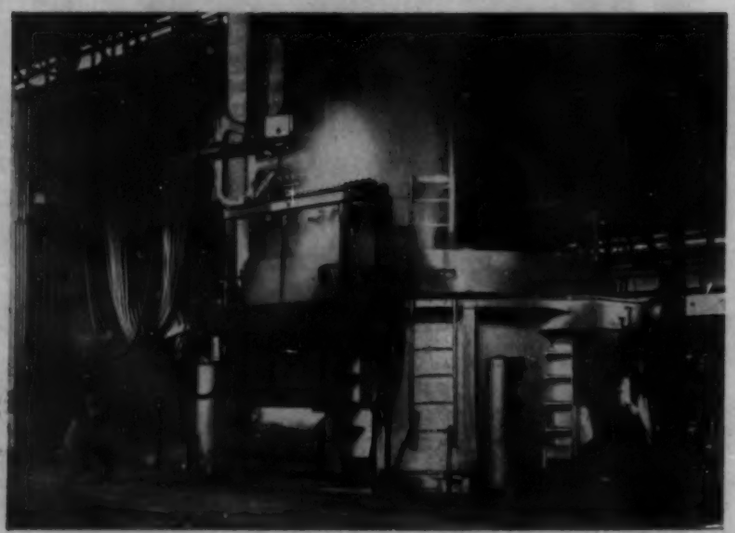
88 *Lectromelts* SOLD IN 1941



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LECTROMELT furnaces are built in sizes ranging from 100 tons to 25 pounds. Both door charge and top charge types are available. Rugged and durable construction. Rapid and economic operation.

PITTSBURGH LECTROMELT FURNACE CORP.
PITTSBURGH, PA.

Alloy Content Extras On WPB Special Steels

Alloy content extras covering bars, bar-strip, billets, blooms and slabs have been issued, effective immediately, by Carnegie-Illinois Steel Corp. These extras cover a range of 16 alloy steels established by the Iron and Steel Branch, War Production Board, and announced March 5.

The list covers steels designated by the NE (National Emergency) prefix, and indicates the national emergency alternate composition ranges, for either basic open hearth or electric furnace steels on the 16 types listed. The list is dated March 25, 1942, and is a supplement to the regular hot-rolled alloy steel extra list published as of Oct. 1, 1941.

Revisions and Additions To Priorities, Allocations

(*Concluded from Page* 47)

mits addition of storage charges to export prices of material acquired prior to Dec. 15, 1941, and held because of failure to secure shipping space; also of material shipped to port of exportation prior to March 1, 1942, and subsequently stranded. Provides for export shipments in exceptional cases where Board of Economic Warfare certifies above-ceiling price is necessary.

Amendment No. 2, effective March 31, 1942, allows sellers of merchant wire products at least a 20% mark-up over mill carload delivered price. Establishes following freight allowances for certain products sold on Pacific coast to reflect higher costs for all-rail shipments: 75 cents per 100 lbs. on plates, 65 cents on hot and cold rolled sheets, 45 cents on structurals and galvanized sheets, 25 cents on hot rolled strip, 20 cents on hot rolled merchant bars. Amendment also clarifies status of retailers and sets up simplified procedure for seeking exceptions to schedule.

No. 55: Second Hand Bags, effective March 30, 1942. Establishes maximum prices according to size of bag and weight of material. Replaces No. 55, issued Dec. 16, 1941, setting prices at Oct. 1-15 level.

No. 67 (Amendments): **New Machine Tools,** effective March 28, 1942. Permits sale of certain machine tools at higher than ceiling prices by Stokerunit Corp., Milwaukee; Fox Grinders Inc., Pittsburgh; Niagara Machine & Tool Works, Buffalo.

No. 70 (Amendment): **Lead,** effective March 31, 1942. Increases by 1⅛ cents a pound the maximum price of antimony content of antimonial lead. Clarifies method of computing maximum prices for battery lead plates by requiring assay only for lead and antimony content, instead of for total metal content.

No. 72: Fuel Oil (Bunker C and No. 6 Grade), effective March 26, 1942. Revokes schedule.

No. 78 (Amendment): **Oxalic Acid,** effective March 31, 1942. Exempts reagent grade from provisions of schedule.

No. 88 (Amendment): **Petroleum and Petroleum Products,** effective March 26, 1942. Raises gasoline ⅛c per gallon, distillate fuel oils 0.4c per gallon, residual fuel oils 20c per barrel in New England states, New York, New

Jersey, Pennsylvania, Delaware, Maryland, Virginia, West Virginia, North and South Carolina, Georgia, Florida (east of Ppalachicola river) and District of Columbia.

No. 100 (Amendment): **Cast Iron Soil Pipe and Fittings,** effective March 31, 1942. Permits producers to compute maximum delivered prices on emergency shipments of less than 250 pounds in the same manner as warehouse shipments are determined.

No. 107 (Amendment): **Used Tires and Tubes,** effective March 31, 1942. Establishes ceiling prices for remolded tires at same levels applying to regrooved tires under this schedule.

No. 110: Household Mechanical Refrigerators (Resale), effective March 30, 1942. Ceilings are manufacturers' recommended retail price lists. Margins of wholesale distributors limited to levels of Oct. 1-15, 1941.

No. 111: Household Vacuum Cleaners (Resale), effective March 30, 1942. Ceilings are manufacturers' recommended retail price lists. Margins of wholesale distributors limited to Oct. 1-15, 1941, levels.

No. 112: Anthracite Coal, effective April 1, 1942. Freezes prices at Oct. 1-15, 1941 levels.

Tin Limitation Leads To Plastic Bearings

Immediate acceleration in the switch to synthetic resin and molded plastic bearings is expected in the steel industry as a result of the WPB stipulation in M-43-a, on March 17, that tin-base babbitt metal hereafter may not contain more than 12 per cent tin as compared with the previous content of 80 to 85 per cent.

Master mechanics have been advised by procurement officers in some instances also to prepare to reduce use of lead-base babbitt metal since the contained metals, antimony and tin, as well as lead, all must be conserved.

War Department has announced plastic fuzes for trench mortars will be used instead of the standard aluminum fuzes. By making this change tons of aluminum will be freed for other military uses and the machine tools previously used in this production are freed for other production.

Neil Flora, Head of Sheet Association, Dies

A. Neil Flora, president, National Association of Flat Rolled Steel Manufacturers, Pittsburgh, died last Friday in that city. He was 64.

Mr. Flora became president of the association in 1933. His earlier experience included chief clerkship of the American Sheet & Tin Plate plant in Dover, O., and successively vice president of operations and general manager of sales for Trumbull Steel Co., Warren, O., whose sheet mill he had helped to build. He resigned in 1928 to become vice president of the association.

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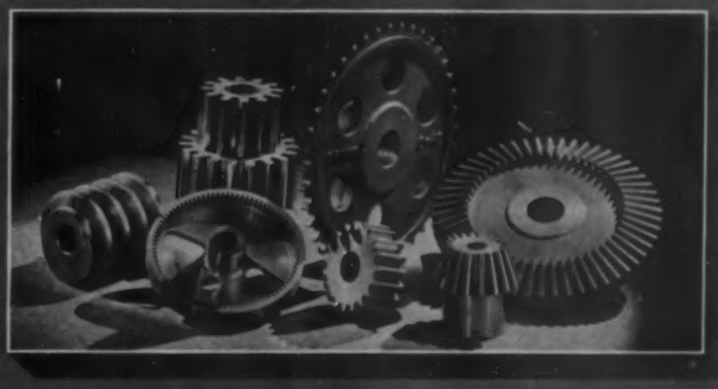

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Construction and Enterprise

Illinois

CHICAGO—Link-Belt Co. has acquired another building of approximately 180,000 square feet for purpose of engaging in special contracts under the war production program.

CHICAGO—Oak Mfg. Co., 1260 North Clybourn avenue, is making further additions to its plant.

CHICAGO — Pullman-Standard Car Mfg. Co., 900 East 103rd street, is engaged in further conversion of existing buildings to aircraft work. It is also constructing a detached building for assembly of special equipment.

CHICAGO—Gage Structural Steel Co., 3141 South Hoyne avenue, has acquired 20,500 square feet of land for expansion of its plant.

CHICAGO — Manufacturers Screw Products, 216 West Hubbard street, has acquired an additional 15,000 square feet of floor space for installation of screw equipment.

CHICAGO—Hudson Screw Machine Products Co., 4500 West Augusta street, has started expansion of its plant.

CHICAGO—Hannifin Mfg. Co., 621 South Kolmar avenue, is making alterations to its plant.

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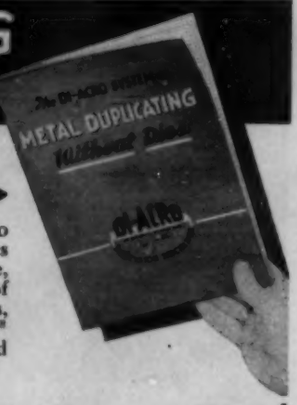
Without Dies



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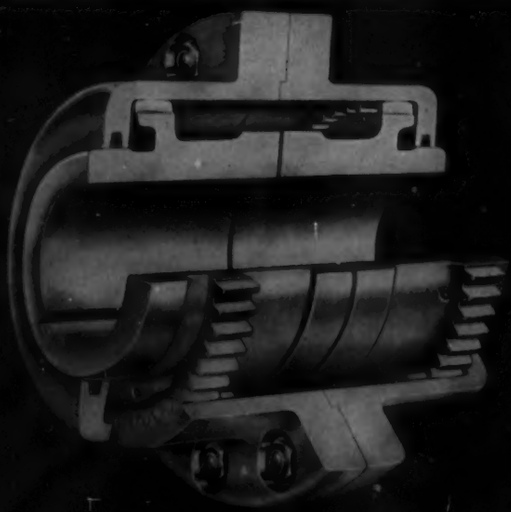


A COPY OF CATALOG GIVING FULL DESCRIPTION AND ENGINEERING DATA SENT UPON REQUEST.

FLEXIBLE COUPLINGS

POOLE FOUNDRY & MACHINE COMPANY WOODBERRY, BALTIMORE, MD.

CHICAGO—M. P. Heinze Machine Co., 6300 North Northwest highway, has leased additional manufacturing space to increase production.

CHICAGO—Electrocast Steel Foundry Co., 4707 West Fifteenth place, Cicero, is making an addition to its plant to facilitate production of cast steel products.

CHICAGO—Master Machine Products, 2364 North Milwaukee avenue, is erecting a building at another location.

CHICAGO — Edward Katzinger Co., 1949 North Cicero avenue, is constructing several additional buildings. B. W. Handler Construction Co., Chicago, contractor.

CHICAGO—National Die Casting Co., 600 North Albany street, is making a second story addition to its plant.

CHICAGO—G & W Electric Specialty Co., 7780 South Dante avenue, is expanding its manufacturing space.

CHICAGO—Midwest Electric Mfg. Co., 1639 West Walnut street, is erecting two-story addition.

CHICAGO—City has been selected for one of four new plants for processing sheet aluminum to be built in various cities.

CHICAGO—Kux Machine Co. has purchased property adjoining its present factory at 3920-40 Harrison street for expansion of its facilities.

OTTAWA, ILL.—Construction of a one-story building on Lincoln place is underway and will be occupied by a machine shop operated by Melvin Jegglie. Henry Krause has general contract.

New York

ELMIRA, N. Y.—Construction of the first section of a new plant to be built here by Remington Rand Inc. will be started soon.

NEW YORK—J. Diner has purchased property of James Gillies Stone Co., 11-49 Forty-fourth road, Long Island City, for establishment of machine shop; will remodel existing buildings.

NEW YORK—Negotiations have been completed for erection of an aluminum plant in the New York metropolitan area. Site has been approved and contracts signed.

NEW YORK—Cummins Diesel Engine Corp. of New York has purchased two buildings on Leggett avenue and will use property for war work.

New Jersey

BOUND BROOK, N. J.—Calco Chemical Corp. has let contract to E. D. Cristofer, Bound Brook, for two-story, 60 x 400-foot plant. Estimated cost $160,000.

GARWOOD, N. J.—Ordnance Mfg. Co., subsidiary of Widin Metal Products Co., has acquired property of Synply Corp., adjacent to Widin plant, and will occupy it in about 30 days.

HARRISON, N. J.—Worthington Pump & Machinery Corp. has let contract to Wigton-Abbott Corp., 1225 South avenue, Plainfield, N. J., for design and construction of storage building, one-story foundry addition, three-story service building.

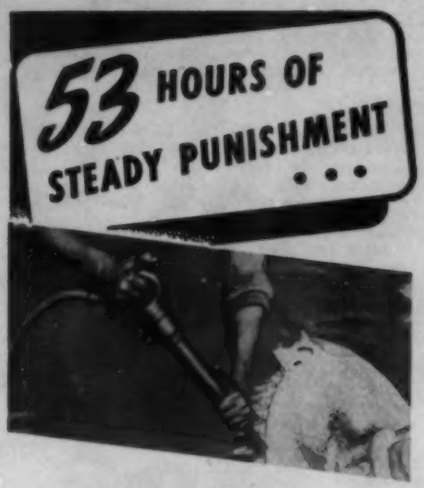
HILLSIDE, N. J.—Glidden Co., Cleveland, has acquired a five-acre tract here for erection of $250,000 factory building.

JERSEY CITY, N. J.—Western Electric Co., New York, has leased property here to expand production.

UNION, N. J.—Wadell Engineering Co., Newark, N. J., has purchased two acres of land on Commerce avenue, for factory buildings.

Ohio

AKRON, O.—Atlantic Foundry Co., 182 Beaver avenue, will extend plant by



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12,000 square feet at cost of $50,000. A 15-ton crane is included in improvements. Charles Reymann is president.

CINCINNATI—Cincinnati Shaper Co. has purchased tract of 11 acres and has let contracts for building covering nearly two acres of floor space.

CLEVELAND—Eaton Mfg. Co., C. I. Ochs, president, plans to establish 100,000 square foot factory at 14330 Darley avenue. Estimated cost $350,000.

CLEVELAND—Wellman Co., S. K. Wellman, president, is expanding production facilities with 19,480 square foot addition.

CLEVELAND—Euclid Road Machinery Co., 1337 Chardon road, E. H. Parkhurst, president, is adding third extension to its plant this year; to cost $3500, exclusive of equipment.

CLEVELAND—Louis J. Kraisner is adding 1680 square feet to his machine shop at 18425 Buffalo avenue.

CLEVELAND—Werner G. Smith Co., Werner G. Smith, vice president, 2191 West 110th street, will alter and add to present boiler plant.

TALLMADGE, O.—Herman Machine & Tool Co. will add 7216 square feet to machine shop at cost of $35,000.

Pennsylvania

ERIE, PA.—American Meter Co. is extending brass foundry at cost of about $15,000.

GETTYSBURG, PA.—Central Chemical Corp. of Pennsylvania, S. G. Spangler, manager, is rebuilding two and three-story 55 x 250-foot plant destroyed by fire. Estimated cost $40,000.

LATROBE, PA.—McKenna Metals Co., Lloyd avenue, has private plans and work will start early this month on additions to factory building. H. K. Ferguson Co., 1650 Hanna building, Cleveland, has been awarded contract.

PITTSBURGH—Edward Crumb Jr. Inc., 4031 Bigelow boulevard, has been awarded contract for industrial buildings, estimated to cost $1,000,000. S. L. Rough, 1210 Chamber of Commerce building, architect.

PITTSBURGH—O. H. Martin, 513 North Homewood avenue, has contract for manufacturing plant, costing $1,000,000. Franklin & Brown, 297 Fulton building, architects.

WILKES-BARRE, PA.—Wilkes-Barre Carriage Co. will spend approximately $60,000 for plant extension.

Michigan

BAY CITY, MICH.—Permit has been granted for a $175,000 addition to plant of Bay Mfg. Co., Bay City.

DETROIT—Bennage & McKinstrie Co., 4612 Woodward avenue, has contract for factory building for Cadillac Gage Co.

DETROIT—Schauer Tool & Die Co. has been incorporated with $12,000 capital to manufacture machine tools and dies; Stephen Schauer, 17142 Lahser road, correspondent.

DETROIT—Castaloy Corp., 227 Iron street, has been organized with $500,000 capital to manufacture metals, dies and engage in engineering work. Correspondent, Theodore M. Curtiss, 4031 Fullerton avenue.

DETROIT—Edward Schilling, 900 Marquette building, architect, is preparing plans for factory and office building in Detroit for Vinco Corp., 9099 Schaefer highway.

DETROIT—Service Conveyor Co., 7764 Bryden, will erect an 80 x 100-foot manufacturing building.

GRAND RAPIDS, MICH.—Plans are

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WESTINGHOUSE

SEE PAGE 92 AND PAGE 93

being prepared by Robinson, Campaul & Crowe, Grand Rapids architects, for construction of factory addition in Grand Rapids.

OWOSSO, MICH.—Central Casting Co. has been incorporated to manufacture gray iron, aluminum and bronze castings; Alonzo S. Harkless, 75 Murray street, correspondent.

PONTIAC, MICH.—L. J. Heenan, Pontiac, architect, is preparing plans for alterations to factory of Wilson Foundry & Machine Co., Pontiac.

Indiana

FORT WAYNE, IND. — Studebaker Corp., South Bend, Ind., will erect gear plant addition, costing $500,000, with equipment.

MUNCIE, IND.—Muncie Gear Co. plans erection of plant to cost over $300,000, including equipment.

RISING SUN, IND.—Brown Tool & Mfg. Co., Rising Sun, will spend approximately $300,000 for plant and equipment.

Maryland

SPARROWS POINT, MD. — Arcrods Corp. has revised plans for one-story factory addition, estimated to cost $150,000. Bids taken early in February have been rejected. (Noted Feb. 23).

Kentucky

LOUISVILLE, KY.—Girdler Corp. is erecting a $300,000 addition to its food machinery plant here.

Georgia

ATLANTA, GA.—War Department has authorized construction of manufacturing plant in Tennessee at cost in excess of $5,000,000; work under supervision of Office of Corps of Engineers, Atlanta.

Mississippi

VICKSBURG, MISS.—War Department has authorized expansion of manufacturing plant in Louisiana at cost of over $5,000,000. Work under supervision of Vicksburg office of Corps of Engineers.

South Carolina

SPARTANBURG, S. C.—Commissioners of public works will take bids April 9 for machinery and equipment for sewage disposal plant.

Virginia

FAIRFAX, VA.—FWA will construct sewer facilities in Fairfax county, including pumping stations and sewage treatment plant. Cost $936,000.

PARKERSBURG, VA.—Penn Metal Co. recently sustained severe damage to its plant by fire.

PORTSMOUTH, VA.—State health and sanitary engineering officials have approved plans for sewage disposal plant and system; $1,700,000 bonds available. Greely & Hansen, 6 North Michigan boulevard, Chicago, engineers.

Missouri

KENNETT, MO.—City, Ben Cash, mayor, has been granted priority on new unit for power and light plant.

ST. LOUIS—L. O. Stocker Co., Arcade building, has contract for factory at 4400 North Union boulevard, for Jackes-Evans Mfg. Co. Estimated cost $125,000. Hugo K. Graf, 2825 Olive street, architect.

ST. LOUIS—H. B. Deal Inc., St. Louis, has been awarded contract for construction of $23,000,000 ammonia and ammonium-nitrate plant in Arkansas. Work is under supervision of United States Army Engineer Corps, Vicksburg, Miss.

Oklahoma

ENID, OKLA.—City plans eight water supply wells complete with pumps and other appurtenances, a 2500-gallon-per-minute high service pump and pump house and chlorinating equipment. Estimated cost $199,000.

MUSKOGEE, OKLA.—City plans new automatic sewage pumping station and pump line, estimated to cost $83,000.

OKLAHOMA CITY, OKLA.—City will vote April 14 on $685,000 water bonds.

Wisconsin

MILWAUKEE—Maynard Electric Steel Casting Co., 2856 South Twenty-seventh street, has awarded contract to Edward Steigerwald & Sons, 5310 West State street, for one-story 120 x 120-foot factory addition.

STILES, WIS.—Oconto Electric Co-operative, Oconto Falls, has REA allotment of $200,000 for hydroelectric power plant. Orbison & Orbison, 206 West College avenue, Appleton, Wis., engineer.

Iowa

KEOKUK, IOWA — Keokuk Electro Metals Co. will take bids soon on superstructure to its power plant to cost $650,000, with equipment. Nemmers & Clark, Hubbell building, Des Moines, Iowa, consulting engineers.

MURRAY, IOWA—H. K. Eden, town clerk, will take bids April 6 on construction of municipal light and power plant. Cost estimated at $80,000. R. W. Gearhart, 349 Twenty-first street, Cedar Rapids, Iowa, consulting engineer.

Louisiana

BATON ROUGE, LA.—Aluminum Co.

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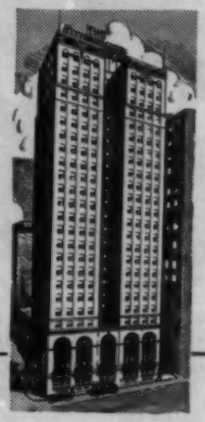

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Florida

GREEN COVE SPRINGS, FLA.—City plans extension and addition to waterworks and sewer system; estimated cost $135,000.

District of Columbia

WASHINGTON—Defense Plant Corp. has authorized an increase in its commitment with International Agricultural Corp. for additional facilities for plants to be located in Texas and New Mexico, to be used for production of metallic magnesium.

California

LOS ANGELES—Production Tooling Co. has been incorporated with 2500 shares of no par value stock, by Mayme Sunshine, Flavio Madariago and Louis Elowitt, all of Los Angeles. Mr. Elowitt, Subway Terminal building, Los Angeles, is correspondent.

Washington

SEATTLE—Associated Machine Works has been incorporated with $25,000 capital by Bogle, Bogle & Gates, Central building, for L. B. Norton and associates.

SEATTLE—Lake Union Drydock & Machine Works, 1515 Fairview avenue North, is making plant additions, including steelworking shop, 30 x 105 feet.

SPOKANE, WASH.—Brown Industries has been granted permit for $50,000 plant, 100 x 300 feet, including boiler plant.

SEATTLE—Variety Foundry, 1245 Utah avenue, plans $16,000 plant addition at Second avenue South and Spokane. Contract has been let to Berg & Patterson.

Oregon

PENDLETON, OREG.—Estimated cost of proposed water system improvements here will be $275,000, according to F. S. Zeisihack, engineer. Plans include pumps and filtration plant.

Canada

NEW WESTMINSTER, B. C.—Boeing Aircraft of Canada Ltd., Sea Island Airport, has acquired a site in Queensborough area of 19 acres and will erect plant building 300 x 800 feet, to cost about $500,000, with equipment.

VANCOUVER, B. C.—Vancouver Iron Works Ltd., 1155 West Sixth street, has let general contract to Dominion Construction Co. Ltd., 509 Richards street, for plant addition, to cost about $70,000, equipment extra.

VICTORIA, B. C.—Victoria Machinery Depot Co. Ltd. has completed plans and will let contracts soon for construction of foundry to cost about $100,000.

ESSEX, ONT.—Wasco Valve Seat Co., has given general contract to William Thompson, 34 Maiden road North, for plant addition, one-story, 50 x 96 feet, to cost about $20,000, with equipment.

LEASIDE, ONT.—Small Electric Motors of Canada Ltd. is considering further addition to plant here. Estimated cost $25,000.

LONDON, ONT.—Canadian Can Mfg. Co. Ltd., 284 York street, plans addition to plant, to cost about $50,000, with equipment.

TORONTO, ONT.—Business Systems Ltd., 52 Spadina avenue, is considering plans for plant addition to cost, with equipment, about $30,000.

WALKERVILLE, ONT. — Dominion Forge & Stamping Co. Ltd. has completed plans and will start work soon on addition to No. 27 plant here, to cost about $85,000. Three heat-treating furnaces will be installed, as well as other equipment.

WELLAND, ONT.—Welland Iron & Brass Co. Ltd., 102 Niagara street, has let contracts for one-story, 27 x 127-foot plant addition to cost about $20,000, excluding equipment.

CAP DE LA MADELEINE, QUE.—Defence Industries Ltd., 1135 Beaver Hall Hill, Montreal, has taken over plant here of International Foils Ltd. and will erect addition and one or two new buildings to cost about $100,000.

LONGUEUIL, QUE. — Dominion Engineering Works Ltd. has started addition to No. 1 machine shop. Hyde & Miller, 1500 Guy street, Montreal, have general contract.

MONTREAL, QUE.—Allied Brass Ltd., has let general contract to Richard & E. J. Ryan Ltd., 1808 William street, for $30,000 plant addition. E. C. Warren is chief engineer.

MONTREAL, QUE.—Canadian Marconi Co. Ltd., 2440 Trenton avenue, Mount Royal, has let general contract to Richard & E. J. Ryan Ltd., 1808 William street, for plant addition to cost $50,000.

MONTREAL, QUE. — Dominion Oilcloth & Linoleum Co. Ltd., Parthenais and St. Catharine street West, has let general contract to Cook & Leitch, 1440 St. Catharine street West, for plant addition to cost about $60,000, including equipment.

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Bay State Abrasive Products Co., Westboro, Mass.
Blanchard Machine Co., The, 64 State St., Cambridge, Mass.
Carborundum Co., The, Niagara Falls, N. Y.
DeSanno, A. P., & Sons, Inc., 436 Wheatland St., Phoenixville, Pa.
Macklin Co., Jackson, Mich.
Norton Co., Worcester, Mass.
Sterling Grinding Wheel Div., Cleveland Quarries Co., Tiffin, O.

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Pangborn Corp., Hagerstown, Md.
Pittsburgh Crushed Steel Co., 4839 Harrison St., Pittsburgh, Pa.

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Carborundum Co., The, Niagara Falls, N. Y.
General Abrasive Co., College Ave., & Hyde Park Blvd., Niagara Falls, N. Y.
Norton Co., Worcester, Mass.

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Farquhar, A. B., Co., Ltd., 175 Duke St., York, Pa.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Morgan Engineering Co., The, Alliance, O.
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

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Linde Air Products Co., The, 30 E. 42nd St., New York City.
National Cylinder Gas Co., 205 W. Wacker Dr., Chicago, Ill.

ACID-PROOF LININGS
Cellcote Co., 750 Rockefeller Bldg., Cleveland, O.
Pennsylvania Salt Mfg. Co., Dept. S, Pennsalt Cleaner Div., Philadelphia, Pa.

ACIDS (Pickling)
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Ampco Metal, Inc., Dept. S-2, 3830 W. Burnham St., Milwaukee, Wis.
Pennsylvania Salt Mfg. Co., Dept. S, Pennsalt Cleaner Div., Philadelphia, Pa.

AEROCASING
Lakeside Steel Improvement Co., The, 5418 Lakeside Ave., Cleveland, O.

AIR COMPRESSORS—See COMPRESSORS (Air)

AIR CONDITIONING EQUIPMENT
American Air Filter Co., 443 Central Ave., Louisville, Ky.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.

AIRLESS BLAST CLEANING EQUIPMENT
American Foundry Equipment Co., The, 509 So. Byrkit St., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.

ALKALI CLEANING COMPOUNDS
Pennsylvania Salt Mfg. Co., Dept. S, Pennsalt Cleaner Div., Philadelphia, Pa.

ALLOYS (Corrosion & Abrasive Resistant)
Wall-Colmonoy Corp., 637 Buhl Bldg., Detroit, Mich.

ALLOYS—See FERROALLOYS

ALLOYS (Magnesium)
Dow Chemical Co., Midland, Mich.

ANGLES, CHANNELS—See BEAMS, CHANNELS, ANGLES

ANNEALING BOXES—See BOXES (Annealing)

ANNEALING COVERS
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Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.

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ANODES (Nickel)
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Columbia Steel Co., San Francisco, Calif.
Republic Steel Corp., Dept. ST, Cleveland, O.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

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Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.

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Gisholt Machine Co., 1217 E. Washington Ave., Madison, Wis.

BALING PRESSES
Galland-Henning Manufacturing Co., 2747 So. 31st St., Milwaukee, Wis.
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BAND SAWS (Metal Cutting)
Continental Machines, Inc., 1324 So. Washington Ave., Minneapolis, Minn.
Disston, Henry, & Sons, Inc., 326 Tacony, Philadelphia, Pa.
Walker-Turner Co., Inc., 5042 Berckman St., Plainfield, N. J.

BANDS—See HOOPS AND BANDS
BANDS (Iron and Steel)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

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Kardong Bros. Inc., 346 Buchanan St., Minneapolis, Minn.

BARGE MOVERS
Silent Hoist Winch & Crane Co., 849 63rd St., Brooklyn, N. Y.

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Bethlehem Steel Co., Bethlehem, Pa.
Dravo Corp. (Engin'r'g Works Div.) Neville Island, Pittsburgh, Pa.
Federal Shipbuilding & Dry Dock Co., Kearney, N. J.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
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Economy Engineering Co., 2657 W. Van Buren St., Chicago, Ill.

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Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

BARRELS (Steel)
Continental Steel Corp., Kokomo, Ind.
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.

BARS (Alloy)
Ampco Metal, Inc., Dept. S-2, 3830 W. Burnham St., Milwaukee, Wis.
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Copperweld Steel Co., Warren, O.
Firth-Sterling Steel Co., McKeesport, Pa.
International Nickel Co. Inc., The, 67 Wall Street, New York City.
LaSalle Steel Co., Chicago, Ill.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.

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Copperweld Steel Co., Warren, O.
Johnson Bronze Co., 550 So. Mill St., New Castle, Pa.
Revere Copper & Brass, Inc., 222 Park Ave., New York City.

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Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Foster, L. B., Co., Inc., P. O. Box 1647, Pittsburgh, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Northwest Steel Rolling Mills, 4315 Ninth Ave., Seattle, Wash.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

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(*Also Stainless)
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*Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
*Copperweld Steel Co., Warren, O.
Enterprise Galvanizing Co., 2825 E. Cumberland St., Philadelphia, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
*Midvale Co., The, Nicetown, Philadelphia, Pa.
*Republic Steel Corp., Dept. ST, Cleveland, O.
*Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Scully Steel Products Co., 1316 Wabansia Ave., Chicago, Ill.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.
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Timken Roller Bearing Co., The, Canton, O.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

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Graybar Electric Co., 420 Lexington Ave., New York City.

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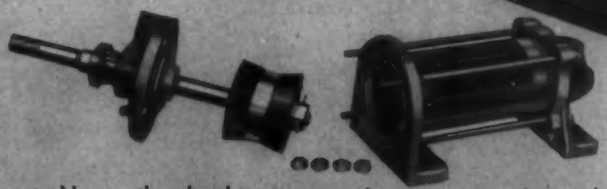

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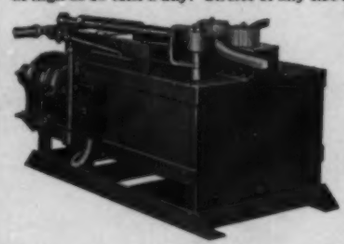

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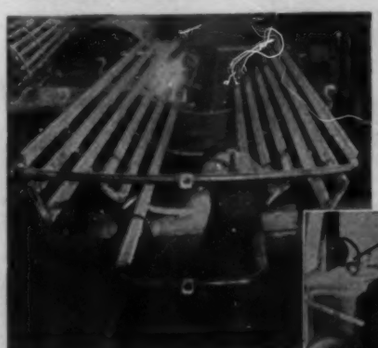

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BLAST FURNACES—See FURNACES (Blast)

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WHERE-TO-BUY

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*Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
*Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
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Triplex Screw Co., The, 5317 Grant Ave., Cleveland, O.

BOLTS (Carriage and Machine)
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Cap Screw Co., 2930 E. 79th St., Cleveland, O.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Triplex Screw Co., The, 5317 Grant Ave., Cleveland, O.

BOLTS (Non-Ferrous and Stainless)
Harper, H. M., Co., The, 2646 Fletcher St., Chicago, Ill.

BOLTS (Special)
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Cap Screw Co., 2930 E. 79th St., Cleveland, O.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

BOLTS (Stove)
Central Screw Co., 3517 Shields Ave., Chicago, Ill.
Cleveland Cap Screw Co., 2934 E. 79th St., Cleveland, O.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.

BOLTS (Stove, Recessed Head)
American Screw Co., Providence, R. I.
Bristol Co., Waterbury, Conn.
Chandler Products Co., Euclid, O.
Continental Screw Co., New Bedford, Mass.
Corbin Screw Corp., New Britain, Conn.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Screw & Mfg. Co., 2440 E. 75th St., Cleveland, O.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Scovill Mfg. Co., Waterbury, Conn.

BOLTS (Track)—See TRACK BOLTS

BORING MACHINES (Precision)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Heald Machine Co., Worcester, Mass.
National Automatic Tool Co., The, Richmond, Ind.
William Sellers & Co., Inc., 16th & Callowhill St., Philadelphia, Pa.

BORING MILLS (Automatic Controls for)
Detroit Universal Duplicator Co., 218 St. Aubin, Detroit, Mich.

BORING TOOLS (Carbide Tipped)
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

BOXES (Annealing)
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
General American Transportation Corp., 135 So. LaSalle St., Chicago, Ill.
National-Erie Corp., Erie, Pa.
Pollock, Wm. B., Co., The, 101 Andrews Ave., Youngstown, O.
Union Steel Casting Div. of Blaw-Knox Co., 62nd & Butler Sts., Pittsburgh, Pa.
United Engineering & Foundry Co., First National Bank Bldg., Pittsburgh, Pa.
Wilson, Lee, Engineering Co., 1368 Blount St., Cleveland, O.

BOXES (Open Hearth Charging)
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Morgan Engineering Co., The, Alliance, O.
Pollock, Wm. B., Co., The, 101 Andrews Ave., Youngstown, O.

BRAKE LININGS
Johns-Manville Corp., 22 E. 40th St., New York City.

BRAKES (Electric)
Clark Controller Co., The, 1146 E. 152nd St., Cleveland, O.
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Electric Controller & Mfg. Co., The, 2700 E. 79th St., Cleveland, O.

BRAKES (Hand)
O'Neil-Irwin Mfg. Co., 304 8th Ave. So., Minneapolis, Minn.

BRAKES (Press)
Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, O.
Cleveland Crane & Engineering Co., The, Steelweld Machinery Div., 1125 E. 283rd St., Wickliffe, O.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.

BRICK (Acid Resisting)
Keagler Brick Co., 1443 W. Market St., Steubenville, O.
Nukem Products Corp., 70 Niagara St., Buffalo, N. Y.

BRICK (Chrome)
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh, Pa.

BRICK—(Insulating)—See INSULATING BRICK

BRICK (Ladle)
Globe Brick Co., The, East Liverpool, O.

BRICK (Refractory)—See REFRACTORIES, CEMENT, ETC.

BRICK (Silica)
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh, Pa.

BRICK (Silicon Carbide)
Bay State Abrasive Products Co., Westboro, Mass.
Carborundum Co., The, Perth Amboy, N. J.
Norton Co., Worcester, Mass.

BRIDGE CRANES (Ore and Coal Handling)—See CRANES (Bridge)

BRIDGES, BUILDINGS, VIADUCTS, STACKS, ETC.
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Belmont Iron Works, 22nd St., and Washington Ave., Philadelphia, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Blaw-Knox Co., Blawnox, Pa.
Columbia Steel Co., San Francisco, Calif.
General American Transportation Corp., 135 So. LaSalle St., Chicago, Ill.
Levinson Steel Co., 33 Pride St., Pittsburgh, Pa.
Robertson, H. H., Co., Farmers Bank Bldg., Pittsburgh, Pa.
Uhl Construction Co., 6001 Butler St., Pittsburgh, Pa

BROACHING CUTTERS
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

BROACHING MACHINES
American Broach & Machine Co., Ann Arbor, Mich.
Bullard Co., The, Bridgeport, Conn
Cincinnati Milling Machine & Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Colonial Broach Co., 147 Jos. Campau, Detroit, Mich

BRUSHES
Fuller Brush Co., The, Hartford, Conn.

BRUSHES (Carbon)
United States Graphite Co., The, Saginaw, Mich.

BRUSHES (Industrial)
Fuller Brush Co., The, Hartford, Conn.

BRUSHES (Steelgript)
Fuller Brush Co., The, Hartford, Conn.

BUCKETS (Clam Shell, Dragline Grab, Single Line)
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.

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Wellman Engineering Co., The, 7016 Central Ave., Cleveland, O.

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Brosius, Edgar E., Co., Sharpsburg Branch, Pittsburgh, Pa.
Wellman Engineering Co., The, 7016 Central Ave., Cleveland, O.

BUILDINGS (Industrial)
Austin Co., The, 16112 Euclid Ave., Cleveland, O.

BUILDINGS (Steel)—See BRIDGES, BUILDINGS, ETC.

BULLDOZERS
Beatty Machine & Mfg. Co., Hammond, Ind.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.

BURNERS (Acetylene)—See TORCHES AND BURNERS

BURNERS (Automatic)
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Bloom Engineering Co., 916 Behan St., Pittsburgh, Pa.
Surface Combustion Div., 2375 Dorr St., Toledo, O.
Wean Engineering Co., Warren, O.
Wilson, Lee, Engineering Co., 1368 Blount St., Cleveland, O.

BURNERS (Fuel, Oil, Gas, Combination)
American Gas Furnace Co., Elizabeth, N. J.
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Bloom Engineering Co., 916 Behan St., Pittsburgh, Pa.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Maehler, Paul, Co., The, 2208 W. Lake St., Chicago, Ill.
Mahr Mfg. Co., Div. of Diamond Iron Works, Inc., Minneapolis, Minn.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Surface Combustion Div., 2375 Dorr St., Toledo, O.
Wean Engineering Co., Warren, O.
Wilson, Lee, Engineering Co., 1368 Blount St., Cleveland, O.

BUSHINGS (Bronze)
Ampco Metal, Inc., Dept. S-2, 3830 W. Burnham St., Milwaukee, Wis.
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
Johnson Bronze Co., 550 So. Mill St., New Castle, Pa.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Shenango-Penn Mold Co., 402 W. Third St., Dover, O.

BUSHINGS (Jig)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

BUSHINGS (Oilless)
Rhoades, R. W., Metaline Co., 43 Third St., Long Island City, N. Y.

BY-PRODUCT PLANTS
Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.

CABINETS (Steel)
Dahlstrom Metallic Door Co., Jamestown, N. Y.

CADMIUM
Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

CADMIUM PLATING PROCESS
Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

CALCIUM METAL AND ALLOYS
Electro Metallurgical Co., 30 E. 42nd St., New York City.

CAP SCREWS—See SCREWS (Cap, Set, Safety-Set)

CAISSONS (Pneumatic)
Dravo Corp., (Contracting Div.), Neville Island, Pittsburgh, Pa.

CAPSTANS (Electric, Gasoline, Diesel)
Silent Hoist Winch & Crane Co., 849 63rd St., Brooklyn, N. Y.

CAR DUMPERS
Alliance Machine Co., The, Alliance, Ohio.
Industrial Brownhoist Corp., Bay City, Mich.

CAR PULLERS and SPOTTERS
American Engineering Co., 2484 Aramingo Ave., Philadelphia, Pa.
Cullen-Friestedt Co., 1308 So. Kilbourn St., Chicago, Ill.
Link-Belt Co., 2410 W. 18th St., Chicago, Ill.
Silent Hoist Winch & Crane Co., 849 63rd St., Brooklyn, N. Y.

CARBIDE
Linde Air Products Co., The, 30 E. 42nd St., New York City.
National Carbide Corp., 60 E. 42nd St., New York City.
National Cylinder Gas Co., 205 W. Wacker Dr., Chicago, Ill.

CARBIDE (Special Parts)
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

CARBIDE TOOLS (Steel Cutting)
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

CARBON SPECIALTIES
United States Graphite Co., The, Saginaw, Mich.

CARBURIZING COMPOUNDS
Park Chemical Co., 8076 Military Ave., Detroit, Mich.

CARBURIZING (Pack or Gas)
Lakeside Steel Improvement Co., The, 5418 Lakeside Ave., Cleveland, O.

CARS (Charging)
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Morgan Engineering Co., The, Alliance, O.
Pollock, Wm. B., Co., The, 101 Andrews Ave., Youngstown, O.

CARS (Dump)
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Differential Steel Car Co., Findlay, O.
Easton Car & Construction Co., Easton, Pa.

CARS (Industrial and Mining)
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Differential Steel Car Co., Findlay, O.
Easton Car & Construction Co., Easton, Pa.
Pollock, Wm. B., Co., The, 101 Andrews Ave., Youngstown, O.

CARS (Scale)
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.

CASTING WASHER EQUIPMENT
Pangborn Corp., Hagerstown, Md.

CASTINGS (Acid Resisting)
Ampco Metal, Inc., Dept. S-2, 3830 W. Burnham St., Milwaukee, Wis.
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
International Nickel Co., Inc., The, 67 Wall St., New York City.
Lebanon Steel Foundry, Lebanon, Pa.
National Alloy Steel Div. of Blaw-Knox Co., Blawnox, Pa.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Shenango-Penn Mold Co., 402 W. Third St., Dover, O.

CASTINGS (Alloy Iron)
Erie Forge Co., W. 15th & Cascade Sts., Erie, Pa.
National Alloy Steel Div. of Blaw-Knox Co., Blawnox, Pa.

CASTINGS (Alloy Steel)
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Bethlehem Steel Co., Bethlehem, Pa.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Electro Alloys Co., The, Elyria, O.
Erie Forge Co., W. 15th & Cascade Sts., Erie, Pa.
Lebanon Steel Foundry, Lebanon, Pa.
Michiana Products Co., Michigan City, Ind.
National Alloy Steel Div. of Blaw-Knox Co., Blawnox, Pa.
National-Erie Corp., Erie, Pa.
Ohio Steel Foundry Co., Lima, O.-Springfield, O.

CASTINGS (Brass, Bronze, Copper, Aluminum)
Ampco Metal, Inc., Dept. S-2, 3830 W. Burnham St., Milwaukee, Wis.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Bethlehem Steel Co., Bethlehem, Pa.
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
Homestead Valve Mfg. Co., P. O. Box 20, Coraopolis, Pa.
Morgan Engineering Co., The, Alliance, O.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Shenango-Penn Mold Co., 402 W. Third St., Dover, O.

CASTINGS (Corrosion Resisting)
Lebanon Steel Foundry, Lebanon, Pa.
National Alloy Steel Div. of Blaw-Knox Co., Blawnox, Pa.
Wall-Colmonoy Corp., 637 Buhl Bldg., Detroit, Mich.

CASTINGS (Die)—See DIE CASTINGS

CASTINGS (Electric Steel)
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Erie Forge Co., W. 15th & Cascade Sts., Erie, Pa.
Lebanon Steel Foundry, Lebanon, Pa.
National-Erie Corp., Erie, Pa.
Reading Steel Casting Div. of American Chain & Cable Co. Inc., Reading, Pa.
West Steel Casting Co., 805 E. 70th St., Cleveland, O.
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

CASTINGS (Gray Iron, Alloy, or Semi-Steel)
American Engineering Co., 2484 Aramingo Ave., Philadelphia, Pa.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Bethlehem Steel Co., Bethlehem, Pa.
Brown & Brown, Inc., 456 So. Main St., Lima, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Erie Foundry Co., Erie, Pa.
Etna Machine Co., The, 3400 Maplewood Ave., Toledo, O.
Ferracute Machine Co., Bridgeton, N. J.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Hyde Park Foundry & Machine Co., Hyde Park, Pa.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Roll & Foundry Co., The, Avonmore, Pa.
Oil Well Supply Co., Dallas, Texas.
Shenango-Penn Mold Co., 402 W. Third St., Dover, O.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

CASTINGS (Heat Resisting)
Electro Alloys Co., The, Elyria, O.
International Nickel Co. Inc., The, 67 Wall Street, New York City.
Lebanon Steel Foundry, Lebanon, Pa.
Michiana Products Co., Michigan City, Ind.
National Alloy Steel Div. of Blaw-Knox Co., Blawnox, Pa.
Shenango-Penn Mold Co., 402 W. Third St., Dover, O.

CASTINGS (Malleable)
American Chain & Cable Co. Inc., Bridgeport, Conn.
Lake City Malleable Co., 5026 Lakeside Ave., Cleveland, O.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CASTINGS (Manganese Steel)
Damascus Steel Casting Co., New Brighton, Pa.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Ferracute Machine Co., Bridgeton, N. J.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
*Midvale Co., The, Nicetown, Philadelphia, Pa.
National-Erie Corp., Erie, Pa.
National Roll & Foundry Co., The, Avonmore, Pa.
Ohio Steel Fdry. Co., Lima, O.-Springfield, O.
Oil Well Supply Co., Dallas, Texas.
Pittsburgh Rolls Div. of Blaw-Knox Co., Pittsburgh, Pa.
Standard Steel Works Div. of Baldwin Locomotive Works, The Paschall P. O., Philadelphia, Pa.
Steel Founders' Society of America, 920 Midland Bldg., Cleveland, O.
Strong Steel Fdry. Co., Hertel & Norris Ave., Buffalo, N. Y.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Union Steel Casting Div. of Blaw-Knox Co., 62nd and Butler Sts., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Western Gas Div., Koppers Co., Fort Wayne, Ind.
West Steel Casting Co., 805 E. 70th St., Cleveland, O.
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

CASTINGS (Steel) (*Also Stainless)
*Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehm, Pa.
Birdsboro Stel Fdry. & Mach. Co., Birdsboro, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Erie Forge Co., W. 15th & Cascade Sts., Erie, Pa.
*Lebanon Steel Foundry, Lebanon, Pa.
*Michiana Products Co., Michigan City, Ind.
Pittsburgh Rolls Div. of Blaw-Knox Co., Pittsburgh, Pa.
Union Steel Casting Div. of Blaw-Knox Co., 62nd and Butler Sts., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

CASTINGS (Wear Resisting)
Hagan, George J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Lebanon Steel Foundry, Lebanon, Pa.
Shenango-Penn Mold Co., 402 W. Third St., Dover, O.
Wall-Colmonoy Corp., 637 Buhl Bldg., Detroit, Mich.

CASTINGS (Worm and Gear Bronze)
Ampco Metal, Inc., Dept. S-2, 3830 W. Burnham St., Milwaukee, Wis.
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.

CEMENT (Acid Proof)
Nukem Products Corp., 70 Niagara St., Buffalo, N. Y.
Pennsylvania Salt Mfg. Co., Dept. S, Pennsalt Cleaner Div., Philadelphia, Pa.

CEMENT (High Temperature)
Bay State Abrasive Products Co., Westboro, Mass.
Carborundum Co., The, Perth Amboy, N. J.
Eagle-Picher Lead Co., The, Cincinnati, O.
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh, Pa.
Johns-Manville Corp., 22 E. 40th St., New York City.
Norton Company, Worcester, Mass.

CEMENT (High Temperature Hydraulic)
Atlas Lumnite Cement Co., Dept. S, Chrysler Bldg., New York City.

CENTRAL STATION EQUIPMENT
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

CHAIN (Conveyor and Elevator)
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Draw Bench)
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Malleable)
Lake City Malleable Co., 5026 Lakeside Ave., Cleveland, O.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Power Transmission)
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

WHERE-TO-BUY

CHAIN (Roller)
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Sling)
American Chain & Cable Co. Inc., Bridgeport, Conn.

CHAIN (Sprocket)
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Steel-Finished Roller)
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Welded or Weldless)
American Chain & Cable Co. Inc., Bridgeport, Conn.

CHARGING MACHINES (Cupola)
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Morgan Engineering Co., The, Alliance, O.

CHARGING MACHINES (Open Hearth)
Morgan Engineering Co., The, Allince, O.
Wellman Engineering Co., The, 7016 Central Ave., Cleveland, O.

CHARGING MACHINES AND MANIPULATORS (Autofloor Type)
Brosius, Edgar E., Co., Sharpsburg Branch, Pittsburgh, Pa.

CHECKER BRICK
Loftus Engineering Corp., 747 Oliver Bldg., Pittsburgh, Pa.

CHECKS (Metal)
Cunningham, M. E., Co., 172 E. Carson St. Pittsburgh, Pa.
Matthews, James H., & Co., 3942 Forbes St., Pittsburgh, Pa.

CHEMICALS (Industrial)
Metal & Thermit Corp., 120 Broadway, New York City.
Park Chemical Co., 8076 Military Ave., Detroit, Mich.
Titanium Alloy Mfg. Co., The, Niagara Falls, N. Y.

CHROME ORE
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

CHROMIUM METAL AND ALLOYS
Electro Metallurgical Co., 30 E. 42nd St., New York City.
Metal & Thermit Corp., 120 Broadway, New York City.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

CHROMIUM PLATING PROCESS
United Chromium, Inc., 51 E. 42nd St., New York City.

CHUCKING MACHINES (Multiple Spindle)
National Acme Co., The, 170 E. 131st St., Cleveland, O.
Oster Mfg. Co., The, 2057 E. 61st St., Cleveland, O.

CHUCKS (Automatic Closing)
Tomkins-Johnson Co., The, Dept. S, 611 N. Mechanic St., Jackson, Mich.

CLAMPS (Drop Forged)
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

CLEANERS (Steam)
Homestead Valve Mfg. Co., P. O. Box 20, Coraopolis, Pa.

CLEANING SPECIALTIES
American Chemical Paint Co., Dept. 310, Ambler, Pa.
MacDermid, Inc., Waterbury, Conn.
Pennsylvania Salt Mfg. Co., Dept. S, Pennsalt Cleaner Div., Philadelphia, Pa.

CLUTCHES (Friction)
Jones, W. A. Fdry. & Mach. Co., 4437 Roosevelt Rd., Chicago, Ill.

CLUTCHES (Magnetic)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.

COAL OR COKE
Alan Wood Steel Co., Conshohocken, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Cleveland-Cliffs Iron Co., Union Commerce Bldg., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Hanna Furnace Corp., The, Ecorse, Detroit, Mich.
Koppers Co., Gas & Coke Div., 300 Koppers Bldg., Pittsburgh, Pa.
Koppers Coal Co., 300 Koppers Bldg., Pittsburgh, Pa.
New England Coal & Coke Co., Boston, Mass.
Pickands Mather & Co., Union Commerce Bldg., Cleveland, O.
Shenango Furnace Co., Oliver Bldg., Pittsburgh, Pa.
Snyder, W. P., & Co., Oliver Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

COAL, COKE, ORE AND ASH HANDLING MACHINERY
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Easton Car & Construction Co., Easton, Pa.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Industrial Brownhoist Corp., Bay City, Mich.
Koppers Co., Engineering & Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.
Koppers-Rheolaveur Co., 300 Koppers Bldg., Pittsburgh, Pa.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

COKE—See COAL OR COKE

COKE OVEN MACHINERY
Alliance Machine Co., The, Alliance, Ohio.
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Morgan Engineering Co., The, Alliance, O.

COKE OVENS (By-Product)
Koppers Co., Engineering and Construction Div., 100 Koppers Bldg., Pittsburgh, Pa.

COLUMBIUM
Electro Metallurgical Co., 30 E. 42nd St., New York City.

COMBUSTION BULBS
Norton Company, Worcester, Mass.

COMBUSTION CONTROLS
Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.
Morgan Construction Co., Worcester, Mass.
Norton Company, Worcester, Mass.

COMPARATORS (Optical)
Jones & Lamson Machine Co., Springfield, Vt.

COMPENSATORS (Automatic)
Electric Controller & Mfg. Co., The, 2700 E. 79th St., Cleveland, O.

COMPOUNDS (Case Hardening, Heat Treating, Polishing)
Park Chemical Co., 8076 Military Ave., Detroit, Mich.

COMPRESSORS (Air)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Cooper-Bessemer Corp., The, Mt. Vernon, O.
Curtis Pneumatic Machinery Div. of Curtis Mfg. Co., 1996 Kienlen Ave., St. Louis, Mo.
General Electric Co., Schenectady, N. Y.

CONCRETE (Heat Resistant)
Atlas Lumnite Cement Co., Dept. S, Chrysler Bldg., New York City.

CONCRETE REINFORCING BARS—See BARS (Concrete Reinforcing)

CONDENSERS (Surface, Barometric, Multi-Jet)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

CONDUITS (Electric)
Youngstown Sheet & Tube Co., The, Youngstown, O.

CONDUITS (Pressure-Treated Wood)
Wood Preserving Corp., The, 300 Koppers Bldg., Pittsburgh, Pa.

CONNECTING RODS
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Heppenstall Co., Box 8-4, 4620 Hatfield St., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1486, Pittsburgh, Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.

CONSTRUCTION (Industrial Building)
Austin Company, The, 16112 Euclid Ave., Cleveland, O.

CONTACTS & CONTACTORS (Electrical)
Mallory, P. R., & Co., 3029 E. Washington Ave., Indianapolis, Ind.

CONTRACT WORK
Commercial Metals Treating, Inc., Toledo, O.
Kirk & Blum Mfg. Co., 2822 Spring Grove Ave., Cincinnati, O.
A. H. Nilson Machine Co., Inc., Bridgeport, Conn.
North Wales Machine Co., Inc., North Wales, Pa.
Orr & Sembower, Inc., Reading, Pa.

CONTRACTORS—See ENGINEERS AND CONTRACTORS

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Sales and Service in the Principal Cities of United States and Canada

» » » WHERE-TO-BUY « « «

CONTROL SYSTEMS (Automatic)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

CONTROLLERS (Electric)
Allen-Bradley Co., 1320 So Second St., Milwaukee, Wis.
Clark Controller Co., The, 1146 E. 152nd St., Clevelanu, O.
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Electric Controller & Mfg. Co., The, 2700 E. 79th St., Cleveland, O.
General Electric Co., Schenectady, N. Y.

CONTROLS (Combustion)—See COMBUSTION CONTROLS

CONTROLS (Temperature)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

CONVEYING SYSTEMS (Steam Jet)
Hagan, George J., Co., 2400 E. Carson St., Pittsburgh, Pa.

CONVEYOR BELTS (Wire)
Cyclone Fence Co., Waukegan, Ill.

CONVEYORS (Apron)
Link-Belt Co., 300 W. Pershing Road, Chicago, Ill.
Mathews Conveyer Co., 142 Tenth St., Ellwood City, Pa.

CONVEYORS (Chain)
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Mathews Conveyer Co., 142 Tenth St., Ellwood City, Pa.

CONVEYORS (Elevating)
Link-Belt Co., 300 W. Pershing Road, Chicago, Ill.
Mathews Conveyer Co., 142 Tenth St., Ellwood City, Pa.

CONVEYORS (Overhead Trolley)
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Link-Belt Co., 300 W. Pershing Road, Chicago, Ill.
Reading Chain & Block Corp., Dept. D-3, Reading, Pa.

CONVEYORS (Roller—Power and Gravity)
Mathews Conveyer Co., 142 Tenth St., Ellwood City, Pa.

COPPER (Phosphorized)
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Revere Copper & Brass, Inc., 222 Park Ave., New York City.

COPPERING COMPOUND
American Chemical Paint Co., Dept. 310, Ambler, Pa.

CORE WASH
United States Graphite Co., The, Saginaw, Mich.

COTTER PINS
American Chain & Cable Co., Inc., York, Pa.
Hindley Mfg. Co., Valley Falls, R. I.
Hubbard, M. D., Spring Co., 443 Central Ave., Pontiac, Mich.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.

COUNTERBORES
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

COUNTING DEVICES
Veeder-Root, Inc., Hartford, Conn.

COUPLINGS (Flexible)
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Clark Controller Co., The, 1146 E. 152nd St., Cleveland, O.
Electric Controller & Mfg. Co., The, 2700 E. 79th St., Cleveland, O.
General Electric Co., Schenectady, N. Y.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
James, D. O., Mfg. Co., 1120 W. Monroe St., Chicago, Ill.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.
Lovejoy Flexible Coupling Co., 4973 W. Lake St., Chicago, Ill.
Nicholson, W. H., & Co., 177 Oregon St., Wilkes-Barre, Pa.
Philadelphia Gear Works, Erie Ave. & G St., Philadelphia, Pa.
Poole Fdy. & Mach. Co., Woodberry St., Baltimore, Md.
Waldron, John, Corp., New Brunswick, N. J.

COUPLINGS (Pipe)
Bethlehem Steel Co., Bethlehem, Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa
Oil Well Supply Co., Dallas, Texas.
Republic Steel Corp., Dept. ST, Cleveland, O.
Youngstown Sheet & Tube Co., The, Youngstown, O.

CRANES, BRIDGE (Ore and Coal Handling)
Alliance Machine Co., The, Alliance, Ohio.
Dravo Corp. (Engineering Works Div.), Neville Island, Pittsburgh, Pa.
Industrial Brownhoist Corp., Bay City, Mich.

CRANES (Charging)
Alliance Machine Co., The, Alliance, Ohio.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Morgan Engineering Co., The, Alliance, O.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

CRANES (Crawler, Erection)
Bucyrus-Erie Corp., S. Milwaukee, Wis.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.
Ohio Locomotive Crane Co., Bucyrus, O.

CRANES (Electric)
Alliance Machine Co., The, Alliance, Ohio.
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Euclid Crane & Hoist Co., The, Chardon Rd., Euclid, Ohio.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Morgan Engineering Co., The, Alliance, O.
Reading Chain & Block Corp., Dept. D-3, Reading, Pa.
Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc., 406 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

CRANES (Gantry)
Alliance Machine Co., The, Alliance, Ohio.
Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Cullen-Friestedt Co., 1308 So. Kilbourn Ave., Chicago, Ill.
Euclid Crane & Hoist Co., The, Chardon Rd., Euclid, Ohio.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.
Ohio Locomotive Crane Co., Bucyrus, O.
Reading Chain & Block Corp., Dept. D-3, Reading, Pa.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

CRANES (Gasoline and Diesel)
Cullen-Friestedt Co., 1308 So. Kilbourn Ave., Chicago, Ill.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.
Ohio Locomotive Crane Co., Bucyrus, O.
Silent Hoist Winch & Crane Co., 849 63rd St., Brooklyn, N. Y.

CRANES (Hand)
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Curtis Pneumatic Machinery Div. of Curtis Mfg. Co., 1996 Kienlen Ave., St. Louis, Mo.
Euclid Crane & Hoist Co., The, Chardon Rd., Euclid, Ohio.
Industrial Brownhoist Corp., Bay City, Mich.
Reading Chain & Block Corp., Dept. D-3, Reading, Pa.
Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc., 406 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
Wright Mfg. Div. of American Chain & Cable Co., Inc., York, Pa.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

CRANES (Jib)
Alliance Machine Co., The, Alliance, Ohio.
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Euclid Crane & Hoist Co., The, Chardon Rd., Euclid, Ohio.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.
Reading Chain & Block Corp., Dept. D-3, Reading, Pa.
Wright Mfg. Div. of American Chain & Cable Co. Inc., York, Pa.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

CRANES (Locomotive)
Cullen-Friestedt Co., 1308 So. Kilbourn Ave., Chicago, Ill.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.
Ohio Locomotive Crane Co., Bucyrus, O.
Silent Hoist Winch & Crane Co., 849 63rd St., Brooklyn, N. Y.

CRANES (Monorail)
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div., of The Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Euclid Crane & Hoist Co., The, Chardon Rd., Euclid, Ohio.
Reading Chain & Block Corp., Dept. D-3, Reading, Pa.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

CRANES (Traveling)
Euclid Crane & Hoist Co., The, Chardon Rd., Euclid, Ohio.
Reading Chain & Block Corp., Dept. D-3, Reading, Pa.
Wright Mfg. Div. of American Chain & Cable Co., Inc., York, Pa.

CRANK SHAFTS
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Erie Forge Co., W. 15th & Cascade Sts., Erie, Pa.
Union Drawn Steel Div. Republic Steel Corp., Massillon, O.
Metal & Thermit Corp., 120 Broadway, New York City.

CRUSHERS
American Pulverizer Co., 1539 Macklind Ave., St. Louis, Mo.
Gruendler Crusher & Pulverizer Co., 2920-28 N. Market St., St. Louis, Mo.

CUSHIONS (Pneumatic)
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.

CUT-OFF MACHINES (Abrasive)
DeSanno, A. P., & Son Inc., 436 Wheatland St., Phoenixville, Pa.

CUTTERS (Die Sinking & End Milling)
Brown & Sharpe Mfg. Co., Providence, R. I.
Tomkins-Johnson Co., The, 611 N. Mechanic St., Dept. S, Jackson, Mich.

CUTTING AND WELDING—See WELDING

CUTTING OILS—See OILS (Cutting)

CUTTING-OFF MACHINES (Rotary)
Motch & Merryweather Machinery Co., Penton Bldg., Cleveland, O.
Taylor-Wilson Mfg. Co., 1200 Thomson Ave. McKees Rocks, Pa.

CYANIDING
Lakeside Steel Improvement Co., The, 5418 Lakeside Ave., Cleveland, O.

CYLINDERS (Air or Hydraulic)
Curtis Pneumatic Machinery Div. of Curtis Mfg. Co., 1996 Kienlen Ave., St. Louis, Mo.
Galland-Henning Mfg. Co., 2747 So. 31st St., Milwaukee, Wis.
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Scaife Co., Ames St., Oakmont, Pa.
Tomkins-Johnson Co., The, Dept. S, 611 N. Mechanic St., Jackson, Mich.

CYLINDERS (Hydraulic)
American Hollow Boring Co., 1054 W. 20th St., Buffalo, N. Y.
Scaife Co., Ames St., Oakmont, Pa.

CYLINDERS (Pressure)
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.
Scaife Co., Ames St., Oakmont, Pa.

DEGREASERS
Magnus Chemical Co., Inc., 206 South Ave., Garwood, N. J.
Pennsylvania Salt Mfg. Co., Dept. S, Pennsalt Cleaner Div., Philadelphia, Pa.

DEOXIDIZERS
Vanadium Corp. of America, 420 Lexington Ave., New York City.

DESCALING PROCESSES
The Bullard Co., Bridgeport, Conn.

DIAMONDS (Wheel Dressing)
Diamond Tool Co., 933 E. 41st St., Chicago, Ill.

DIE BLOCKS
American Shear Knife Co., 3rd & Ann Sts., Homestead, Pa.
Ampco Metal, Inc., Dept. S-2, 3830 W. Burnham St., Milwaukee, Wis.
Bissett Steel Co., The, 943 E. 67th St., Cleveland, O.
Heppenstall Co., Box 8-4, 4620 Hatfield St., Pittsburgh, Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.

DIE CENTERS
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

DIE CUSHIONS
Dayton Rogers Co., Minneapolis, Minn.

DIE HANDLING EQUIPMENT (Lifters)
Economy Engineering Co., 2657 W. Van Buren St., Chicago, Ill.

DIE HEADS
Jones & Lamson Machine Co., Springfield, Vt.
Landis Machine Co., Waynesboro, Pa.
National Acme Co., The, 170 E. 131st St., Cleveland, O.
Oster Mfg. Co., The, 2037 E. 61st St., Cleveland, O.

DIE-SINKING MACHINES
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.

DIES (Punching, Stamping, Blanking)
Columbus Die, Tool & Mach. Co. 955 Cleveland Ave., Columbus, O.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

DIES (Steel, Embossing)
Cunningham, M. E., Co., 172 E. Carson St., Pittsburgh, Pa.

WHERE-TO-BUY

DOLOMITE—FLUX AND REFRACTORIES
Basic Refractories, Inc., Hanna Bldg., Cleveland, O.

DOORS & SHUTTERS (Steel, Fire, and Rolling)
Kinnear Mfg. Co., 1780-1800 Fields Ave., Columbus, O.

DOORS & TRIM (Metal)
Dahlstrom Metallic Door Co., Jamestown, N. Y.

DRAFT GAGES (Indicating, Recording)
Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.

DRAGLINES (Crawler)
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.

DRAW BENCHES
Vaughn Machinery Co., Cuyahoga Falls, O.

DRESSERS (Grinding Wheel)
Diamond Tool Co., 933 E. 41st St., Chicago, Ill.

DRILL HEADS (Multiple)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

DRILL RODS—See RODS (Drill)

DRILLING MACHINERY
Walker-Turner Co., Inc., 5042 Berckman St., Plainfield, N. J.

DRILLING MACHINES (Multiple Spindle)
National Automatic Tool Co., The, Richmond, Ind.

DRILLING MACHINES (Radial)
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Walker-Turner Co., Inc., 5042 Berckman St., Plainfield, N. J.

DRILLING MACHINES (Vertical)
Bryant Machinery & Engineering Co., 400 W. Madison St., Chicago, Ill.
Cleereman Machine Tool Co., Green Bay, Wis.
Walker-Turner Co., Inc., 5042 Berckman St., Plainfield, N. J.

DRILLS (Twist)—See TWIST DRILLS

DRIVES (Chain)
Link-Belt Co., 220 S. Belmont Ave Indianapolis, Ind.
Simonds Gear & Mfg. Co., The, 25th St., Pittsburgh, Pa.

DRIVES (Cut Herringbone Gear)
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Philadelphia Gear Works, Erie Ave. & G St., Philadelphia, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

DRIVES (Machine Tool)
Berkeley Equipment Co., First Avenue, Corry, Pa.

DRIVES (Motor)
Berkeley Equipment Co., First Avenue, Corry, Pa.

DRIVES (Multi-V-Belt)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.

DRUMS (Steel)
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.

DRYERS (Compressed Air)
Ruemelin Mfg. Co., 3882 N. Palmer St., Milwaukee, Wis.

DRYERS (Paint, Varnish, Enamel, Chemical)
Maehler, Paul, Co., The, 2208 W. Lake St., Chicago, Ill.

DRYERS (Rotary)
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

DUCTS (Acid Fume, Rubber Lined)
American Hard Rubber Co., 11 Mercer St., New York City.

DUST ARRESTING EQUIPMENT
American Air Filter Co., 443 Central Ave., Louisville, Ky.
American Foundry Equipment Co., The, Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.
Ruemelin Mfg. Co., 3882 N. Palmer St., Milwaukee, Wis.
Torit Mfg. Co., 285 Walnut St., St. Paul, Minn.

ECONOMIC SERVICE
Brookmire Corp., 551 Fifth Ave., New York City.

ECONOMIZERS
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.

ELECTRIC WELDING—See WELDING

ELECTRIC WIRING—See WIRE AND CABLE

ELECTRICAL EQUIPMENT
Allen-Bradley Co., 1320 So. Second St., Milwaukee, Wis.
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Electric Controller & Mfg. Co., The, 2700 E. 79th St., Cleveland, O.
Fairbanks, Morse & Co., Dept. D75, 600 S. Michigan Ave., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Graybar Electric Co., 420 Lexington Ave., New York City.

ELECTRODES (Carbon and Graphite)
National Carbon Co., W. 117th St. at Madison Ave., Cleveland, O.

ELECTRODES (Hard Surfacing Welding)
Metal & Thermit Corp., 120 Broadway, New York City.

ELECTRODES (Resistance Welding)
Mallory, P. R., & Co., 3029 E. Washington Ave., Indianapolis, Ind.

ELEVATING AND CONVEYING MACHINERY—See CONVEYORS

ENGINEERS AND CONTRACTORS
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Austin Co., The, 16112 Euclid Ave., Cleveland, O.
McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland, O.
Morgan Engineering Co., The, Alliance, O.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Pollock, Wm. B., Co., The, 101 Andrews Ave., Youngstown, O.
Uhl Construction Co., 6001 Butler St., Pittsburgh, Pa.
Wean Engineering Co., Warren, O.

ENGINEERS (Consulting)
Austin Co., The, 16112 Euclid Ave., Cleveland, O.
Easton Car & Construction Co., Easton, Pa.
Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.
Loftus Engineering Corp., [illegible] Oliver Bldg., Pittsburgh, Pa.
McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland, O.
Wean Engineering Co., Warren, O.

ENGINES (Diesel)
Cooper-Bessemer Corp., The, Mt. Vernon, O.
Fairbanks, Morse & Co., Dept. D75, 600 So. Michigan Ave., Chicago, Ill.

ENGINES (Gas, Oil)
Fairbanks, Morse & Co., Dept. D75, 600 So. Michigan Ave., Chicago, Ill.

ENGINES (Kerosene)
Fairbanks, Morse & Co., Dept. D75, 600 S. Michigan Ave., Chicago, Ill.

ENGINES (Steam)
Oil Well Supply Co., Dallas, Texas

EXCAVATORS
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.

FACTORY & INDUSTRIAL BUILDINGS—See BUILDINGS (Industrial)

FANS (Crane Cab)
Graybar Electric Co., 420 Lexington Ave., New York City.
Perkins, B. F., & Son, Inc., Holyoke, Mass.

FANS (Exhaust Ventilating)
Graybar Electric Co., 420 Lexington Ave., New York City.
Sturtevant, B. F., Co., 1316 Wabansia Ave., Chicago, Ill

FANS (Portable)
Graybar Electric Co., 420 Lexington Ave., New York City.
Perkins, B. F., & Son, Inc., Holyoke, Mass.

FANS (Wall)
Graybar Electric Co., 420 Lexington Ave., New York City.
Perkins, B. F., & Son, Inc., Holyoke, Mass.

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FENCE (Chain Link)
Continental Steel Corp., Kokomo, Ind.
Cyclone Fence Co., Waukegan, Ill.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.

FENCING (Wire)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

FERROALLOY (Briquets)
Electro Metallurgical Co., 30 E. 42nd St., New York City.

FERROALLOYS
Cleveland-Cliffs Iron Co., The, Union Commerce Bldg., Cleveland, O.
Electro Metallurgical Co., 30 E. 42nd St., New York City.
International Nickel Co., Inc., The, 67 Wall St., New York City.
Metal & Thermit Corp., 120 Broadway, New York City.
Titanium Alloy Mfg. Co., The, Niagara Falls, N. Y.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

FERROCHROME
Electro Metallurgical Co., 30 E. 42nd St., New York City.
Samuel, Frank & Co., Inc., Harrison Bldg., Philadelphia, Pa.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

FERROMANGANESE
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Electro Metallurgical Co., 30 E. 42nd St., New York City.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

FERROPHOSPHORUS
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

FERROSILICON
Electro Metallurgical Co., 30 E. 42nd St., New York City.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.
Southern Ferro Alloys Co., 2108 Chestnut St., Chattanooga, Tenn.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

FERROSILICON ALUMINUM
Vanadium Corp. of America.

FERROTITANIUM
Metal & Thermit Corp., 120 Broadway, New York City.
Titanium Alloy Mfg. Co., The, Niagara Falls, N. Y.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

FERROVANADIUM
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
Vanadium Corp. of America, 420 Lexington Ave..

FILES AND RASPS
Atkins, E. C., & Co., 427 So. Illinois St., Indianapolis, Ind.
Disston, Henry, & Sons, Inc., 326 Tacony, Philadelphia, Pa.
Simonds Saw & Steel Co., 470 Main St., Fitchburg, Mass.

FILTER CLOTH (Asbestos)
Johns-Manville Corp., 22 E. 40th St., New York City.

FIRE CLAY—See REFRACTORIES

FIRE DOORS & SHUTTERS—See DOORS & SHUTTERS

FIRE EXTINGUISHERS
C-O-Two Fire Equipment Co., 10 Empire St., Newark, N. J.
Kidde, Walter, & Co., Inc., 332 West St., Bloomfield, N. J.

FIRE EXTINGUISHING SYSTEMS
C-O-Two Fire Equipment Co., 10 Empire St., Newark, N. J.

FIRE PROTECTION EQUIPMENT
C-O-Two Fire Equipment Co., 10 Empire St., Newark, N. J.
Walter Kidde & Co., Inc., 332 West St., New York, N. Y.

FITTINGS (Electric Steel)
Reading-Pratt & Cady Div. of American Chain & Cable Co., Inc., Bridgeport, Conn.

FITTINGS (Rubber Lined)
American Hard Rubber Co., 11 Mercer St., New York City.

FLAME HARDENING
Air Reduction, 60 E. 42nd St., New York City.
Linde Air Products Co., 30 E. 42nd St., New York City.
National-Erie Corp., Erie, Pa.

FLANGES (Welded Steel)
King Fifth Wheel Co., 2915 No. Second St., Philadelphia, Pa.

FLOORING (Monolithic)
Carey, Philip, Co., The, Lockland, Cincinnati, O.
Johns-Manville Corp., 22 E. 40th St., New York City.

FLOORING (Steel)
Alan Wood Steel Co., Conshohocken, Pa.
Blaw-Knox Co., Blawnox, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Dravo Corp. (Machinery Div.), 300 Penn Ave., Pittsburgh, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Republic Steel Corp., Dept. ST, Cleveland, O.
Robertson, H. H. Co., Farmers Bank Bldg., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Scully Steel Products Co., 1316 Wabansia Ave., Chicago, Ill.
Tri-Lok Co., 5515 Butler St., Pittsburgh, Pa.

FLUE DUST CONDITIONERS
Brosius, Edgar E., Co., Sharpsburg, Branch, Pittsburgh, Pa.

FLUE GAS ANALYZERS
Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.

FLUORSPAR
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

FLUXES (Soldering, Welding & Tinning)
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Kester Solder Co., 4222 Wrightwood Ave., Chicago, Ill.
Wayne Chemical Products Co., 9502 Copeland St., Detroit, Mich.

FORGING BILLETS—See BILLETS

FORGING MACHINERY
Alliance Machine Co., The, Alliance, Ohio.
Erie Foundry Co., Erie, Pa.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.
National Machinery Co., The, Tiffin, O.

FORGINGS (Aluminum, Brass, Bronze, Copper)
American Brass Co., The, Waterbury, Conn.
Ampco Metal, Inc., Dept. S-2, 3830 W. Burnham St., Milwaukee, Wis.
Bridgeport Brass Co., Bridgeport, Conn.
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

FORGINGS (Drop) (*Also Stainless)
*Atlas Drop Forge Co., Lansing, Mich.
*Bethlehem Steel Co., Bethlehem, Pa.
Oil Well Supply Co., Dallas, Texas.
Oliver Iron & Steel Corp., So. 10th & Muriel Sts., Pittsburgh, Pa.

FORGINGS (Hollow Bored)
American Hollow Boring Co., 1054 W. 20th St., Erie, Pa.
Atlas Drop Forge Co., Lansing, Mich.
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Erie Forge Co., W. 15th & Cascade Sts., Erie, Pa.

FORGINGS (Iron and Steel) (*Also Stainless)
*Atlas Drop Forge Co., Lansing, Mich.
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Erie Forge Co., W. 15th & Cascade Sts., Erie, Pa.
Heppenstall Co., Box 8-4, 4620 Hatfield St., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
*Midvale Co., The, Nicetown, Philadelphia, Pa.
Oil Well Supply Co., Dallas, Texas.
Standard Steel Works Div. of The Baldwin Locomotive Works, Paschall P. O., Philadelphia, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

FORGINGS (Small)
Oliver Iron & Steel Corp., So. 10th & Muriel Sts., Pittsburgh, Pa.

FORGINGS (Upset)
Atlas Drop Forge Co., Lansing, Mich.
Bethlehem Steel Co., Bethlehem, Pa.
Oliver Iron & Steel Corp., So. 10th & Muriel Sts., Pittsburgh, Pa.

FOUNDRY EQUIPMENT
American Foundry Equipment Co., The, Mishawaka, Ind.

FROGS AND SWITCHES
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.

FURNACE INSULATION—See INSULATION

FURNACES (Blast)
McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland, O.
Pollock, Wm. B., Co., The, 101 Andrews Ave., Youngstown, O.

FURNACES (Brazing)
Bellis Heat Treating Co., Branford, Conn.
Hevi Duty Electric Co., 4100 W. Highland Blvd., Milwaukee, Wis.

FURNACES (Electric Heating)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Bellis Heat Treating Co., Branford, Conn.
Electric Furnace Co., The, Salem, O.
General Electric Co., Schenectady, N. Y.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Hevi Duty Electric Co., 4100 W. Highland Blvd., Milwaukee, Wis.
Mahr Mfg. Co., Div. of Diamond Iron Works, Inc., Minneapolis, Minn.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1257, Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

FURNACES (Electric Melting)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Detroit Electric Furnace Div., Kuhlman Electric Co., Bay City, Mich.
General Electric Co., Schenectady, N. Y.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1257, Pittsburgh, Pa.

FURNACES (Enameling)
Hagan, George J., Co., 2400 E. Carson St., Pittsburgh, Pa.

FURNACES (Forging)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Amsler-Morton Co., The, Fulton Bldg., Pittsburgh, Pa.
Bellis Heat Treating Co., Branford, Conn.
Electric Furnace Co., The, Salem, O.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Surface Combustion Div., 2375 Dorr St., Toledo, O.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.

FURNACES (Galvanizing)
Salem Engineering Co., 714 So. Broadway, Salem, O.

FURNACES (Gas or Oil)
Electric Furnace Co., The, Salem, O.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Surface Combustion Div., 2375 Dorr St., Toledo, O.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.

FURNACES (Heat Treating, Annealing, Carburizing, Hardening, Tempering)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
American Gas Furnace Co., Elizabeth, N. J.
Amsler-Morton Co., The, Fulton Bldg., Pittsburgh, Pa.
Bellis Heat Treating Co., Branford, Conn.
Carborundum Co., The, Perth Amboy, N. J.
Electric Furnace Co., The, Salem, O.
General Electric Co., Schenectady, N. Y.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Hevi Duty Electric Co., 4100 W. Highland Blvd., Milwaukee, Wis.
A. F. Holden Co., The, 200 Winchester Ave., New Haven, Conn.
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.
Mahr Mfg. Co., Div. of Diamond Iron Works, Inc., Minneapolis, Minn.
Ohio Crankshaft Co., The, 6600 Clement Ave., Cleveland, O.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Surface Combustion Div., 2375 Dorr St., Toledo, O.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.
Wean Engineering Co., Warren, O.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

FURNACES (Laboratory)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Dietert, Harry W., Co., 9330J Roselawn Ave., Detroit, Mich.
Hevi Duty Electric Co., 4100 W. Highland Blvd., Milwaukee, Wis.

FURNACES (Non-Ferrous Melting)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Detroit Electric Furnace Div., Kuhlman Electric Co., Bay City, Mich.

FURNACES (Open Hearth)
Amsler-Morton Co., The, Fulton Bldg., Pittsburgh, Pa.
McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland, O.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.

FURNACES (Portable)
Hagan, George J., Co., 2400 E. Carson St., Pittsburgh, Pa.

FURNACES (Recuperative)
Electric Furnace Co., The, Salem, O.
Hagan, Geo. J. Co., 2400 E. Carson St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Surface Combustion Div., 2375 Dorr St., Toledo, O.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.

FURNACES (Rivet Heating)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Surface Combustion Div., 2375 Dorr St., Toledo, O.

FURNACES (Sheet and Tin Mill)
Electric Furnace Co., The, Salem, O.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Surface Combustion Div., 2375 Dorr St., Toledo, O.

WHERE-TO-BUY

FURNACES (Sheet & Tin Mill)—Con.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.
Wean Engineering Co., Warren, O.
Wilson, Lee, Engineering Co., 1368 Blount St., Cleveland, O.

FURNACES (Steel Mill)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Electric Furnace Co., The, Salem, O.
General Electric Co., Schenectady, N. Y.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Surface Combustion Div., 2375 Dorr St., Toledo, O.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.
Wellman Engineering Co., The, 7016 Central Ave., Cleveland, O.
Wilson, Lee, Engineering Co., 1368 Blount St., Cleveland, O.

FURNACES (Welding)
Hagan, George J., Co., 2400 E. Carson St., Pittsburgh, Pa.

GAGE BLOCKS
Dearborn Gage Co., 22036 Beech St., Dearborn, Mich.

GAGES
Brown & Sharpe Mfg. Co., Providence, R. I.
Federal Products Corp., 1144 Eddy St., Providence, R. I.
Greenfield Tap & Die Corp., Greenfield, Mass.
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.
Sheffield Corp., The, Gage Div., Dayton, O.

GAGES (Automatic Control & Recording)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.

GAGES (Indicating and Recording)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
General Electric Co., Schenectady, N. Y.
Sheffield Corp., The, Gage Div., Dayton, O.

GAGES (Pressure & Vacuum Recording)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.

GALVANIZING (Hot Dip)
Acme Galvanizing, Inc., Milwaukee, Wis.
Acme Steel & Malleable Iron Works, Buffalo, N. Y.
American Hot Dip Galvanizers Assoc., Inc., 903 American Bank Bldg., Pittsburgh, Pa.
American Tinning & Galvanizing Co., Erie, Pa.
Atlantic Steel Co., Atlanta, Ga.
Buffalo Galvanizing & Tinning Works, Inc., Buffalo, N. Y.
Cattie, Jos. P., & Bros., Gaul and Liberty Sts., Philadelphia, Pa.
Diamond Expansion Bolt Co., Inc., Garwood, N. J.
Enterprise Galvanizing Co., 2525 E. Cumberland St.,
Equipment Steel Products Div., of Union Asbestos & Rubber Co., Blue Island, Ill.
Galvanizers Incorporated, Portland, Ore.
Fanner Mfg. Co., The, Cleveland, O.
Finn, John, Metal Works, San Francisco, Calif.
Gregory, Thomas, Galvanizing Works, Maspeth, N. Y.
Hanlon-Gregory Galvanizing Co., 5515 Butler St., Pittsburgh, Pa.
Hill, James, Mfg. Co., Providence, R. I.
Hubbard & Co., Oakland, Calif.
Independent Galvanizing Co., Newark, N. J.
International-Stacey Corp., Columbus, O.
Isaacson Iron Works, Seattle, Wash
Joslyn Co. of California, Los Angeles, Calif.
Joslyn Mfg. & Supply Co., Chicago, Ill.
Koven, L. O., & Bro., Inc., Jersey City, N. J.
Lehigh Structural Steel Co., Allentown, Pa.
Lewis Bolt & Nut Co., Minneapolis, Minn.
Missouri Rolling Mill Corp., St. Louis, Mo.
National Telephone Supply Co., The, Cleveland, O.
Penn Galvanizing Co., Philadelphia, Pa.
Riverside Foundry & Galvanizing Co., Kalamazoo, Mich.
San Francisco Galvanizing Works, San Francisco, Calif.
Sanitary Tinning Co., The, Cleveland, O.
Scaife Co., Ames St., Oakmont, Pa.
Standard Galvanizing Co., Chicago, Ill.
Wilcox, Crittenden & Co., Inc., Middletown, Conn.
Witt Cornice Co., The, Cincinnati, O.

GALVANIZING PLANTS FOR SHEETS
Erie Foundry Co., Erie, Pa.
Wean Engineering Co., Warren, O

GALVANIZING PRODUCTS
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.

GAS HOLDERS
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Bethlehem Steel Co., Bethlehem, Pa.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

GAS PRODUCER PLANTS
Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.
Morgan Construction Co., Worcester, Mass.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

GAS RECOVERY COKE OVEN AND GAS PLANTS
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.

GAS SCRUBBERS
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

GASKETS (Asbestos, Metal or Rubber)
Johns-Manville Corp., 22 E. 40th St., New York City.

GEAR BLANKS
Ampco Metal, Inc., Dept. S-2, 3830 W. Burnham St., Milwaukee, Wis.
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
King Fifth Wheel Co., 2915 No. Second St., Philadelphia, Pa.
National-Erie Corp., Erie, Pa.
Philadelphia Gear Works, Erie Ave. & G St., Philadelphia, Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Waldron, John, Corp., New Brunswick, N. J.

GEAR MACHINERY (Generating)
National Broach & Machine Co., 5600 St. Jean, Detroit, Mich.

GEAR MACHINERY (Lapping, Finishing, Checking)
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.

GEARS (Non-Metallic)
Chicago Rawhide Mfg. Co., 1308 Elston Ave., Chicago, Ill.
Pittsburgh Gear & Machine Co., 2680-2700 Smallman St., Pittsburgh, Pa.
Simonds Gear & Mfg. Co., The, 25th St., Pittsburgh, Pa.

GEARS (Steel Laminated)
Simonds Gear & Mfg. Co., The, 25th St., Pittsburgh, Pa.
Waldron, John, Corp., New Brunswick, N. J.

GEARS (Worm)
Cleveland Worm & Gear Co., 3270 E. 80th St., Cleveland, O.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.
Philadelphia Gear Works, Erie Ave. & G St., Philadelphia, Pa.
Pittsburgh Gear & Machine Co., 2680-2700 Smallman St., Pittsburgh, Pa.
Simonds Gear & Mfg. Co., The, 25th St., Pittsburgh, Pa.

GEARS AND GEAR CUTTING
General Electric Co., Schenectady, N. Y.
Grant Gear Works, 2nd & B Sts., Boston, Mass.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
James, D. O., Mfg. Co., 1120 W. Monroe St., Chicago, Ill.

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Jones, W. A., Fdry. & Mach. Co., 4437 Roosevelt Rd., Chicago, Ill.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.
National-Erie Corp., Erie, Pa.
Philadelphia Gear Works, Erie Ave. & G St., Philadelphia, Pa.
Pittsburgh Gear & Machine Co., 2680-2700 Smallman St., Pittsburgh, Pa.
Simonds Gear & Mfg. Co., 25th St., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

GENERATING SETS
Fairbanks, Morse & Co., Dept. D75, 600 So. Michigan Ave., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Reliance Electric & Eng. Co., 1081 Ivanhoe Rd., Cleveland, O.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

GENERATORS (Acetylene—Portable and Stationary)
Linde Air Products Co., The, 30 E. 42nd St., New York City.

GENERATORS (Electric)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Fairbanks, Morse & Co., Dept. D75, 600 S. Michigan Ave., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Lincoln Electric Co., The, Cleveland, O.
Reliance Electric & Eng. Co., 1081 Ivanhoe Rd., Cleveland, O.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

GENERATORS (Plating)
Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

GRABS—FOR SHEETS, COILS, INGOTS
J-B Engineering Sales Co., 1743 Orange St., New Haven, Conn.

GRAPHITE
United States Graphite Co., The, Saginaw, Mich.

GRATING
Blaw-Knox Co., Blawnox, Pa.
Dravo Corp., (Machinery Div.), 300 Penn Ave., Pittsburgh, Pa.
Tri-Lok Co., 5515 Butler St., Pittsburgh, Pa.

GREASE (Lubricating)—See LUBRICANTS (Industrial)

GREASE RETAINERS AND SEALS
Chicago Rawhide Mfg. Co., 1308 Elston Ave., Chicago, Ill.

GRINDER CENTERS
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

GRINDER HEADS
Fitchburg Grinding Machine Corp., Fitchburg, Mass.

GRINDERS (Circular Saw)
Motch & Merryweather Machinery Co., Penton Bldg., Cleveland, O.

GRINDERS (Foundry Core)
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee, Wis.

GRINDERS (Precision Thread)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Jones & Lamson Machine Co., Springfield, Vt.

GRINDERS (Single Slide Internal)
Bryant Chucking Grinder Co., Springfield, Vt.

GRINDERS (Surface)
Brown & Sharpe Mfg. Co., Providence, R. I.
Heald Machine Co., Worcester, Mass.
Norton Company, Worcester, Mass.

GRINDING (Shear Knife)
American Shear Knife Co., 3rd & Ann Sts., Homestead, Pa.

GRINDING COMPOUNDS
Stuart, D. A., Oil Co., Ltd., 2733 S. Troy St., Chicago, Ill.
Sun Oil Co., Dept. 1, 1608 Walnut St., Philadelphia, Pa.
Wayne Chemical Products Co., 9603 Copeland St., Detroit, Mich.

GRINDING MACHINE ATTACHMENTS
Fitchburg Grinding Machine Corp., Fitchburg, Mass.

GRINDING MACHINES (Automotive Reconditioning)
Heald Machine Co., Worcester, Mass.

GRINDING MACHINES (Bench & Floor Type)
Walker-Turner Co., Inc., 5012 Berckman St., Plainfield, N. J.

GRINDING MACHINES (Centerless, Internal and External)
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Heald Machine Co., Worcester, Mass.

GRINDING MACHINES (Chucking)
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Fitchburg Grinding Machine Corp., Fitchburg, Mass.
Heald Machine Co., Worcester, Mass.

GRINDING MACHINES (Crank Pin, Cam, Piston & Valve Face)
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Norton Company, Worcester, Mass.

GRINDING MACHINES (Die)
Fitchburg Grinding Machine Corp., Fitchburg, Mass.

GRINDING MACHINES (Gear)
Fitchburg Grinding Machine Corp., Fitchburg, Mass.

GRINDING MACHINES (Oscillating)
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.

GRINDING MACHINES (Plain and Universal)
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Fitchburg Grinding Machine Corp., Fitchburg, Mass.
Norton Co., Worcester, Mass.

GRINDING MACHINES (Roll)
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Norton Co., Worcester, Mass.

GRINDING MACHINES (Rotary Surface)
Bianchard Machine Co., The, 64 State St., Cambridge, Mass.
Heald Machine Co., Worcester, Mass.

GRINDING MACHINES (Segmental)
Norton Company, Worcester, Mass.

GRINDING MACHINES (Spline)
Fitchburg Grinding Machine Corp., Fitchburg, Mass.

GRINDING MACHINES (Tool and Cutter)
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Fitchburg Grinding Machine Corp., Fitchburg, Mass.
Kearney & Trecker Corp., 5926 National Ave., Milwaukee, Wis.
Norton Co., Worcester, Mass.
Oster Mfg. Co., The, 2037 E. 61st St., Cleveland, O.
Walker-Turner Co., Inc., 5042 Berckman St., Plainfield, N. J.
William Sellers & Co., Inc., 16th & Callowhill St., Philadelphia, Pa.

GRINDING WHEELS
Abrasive Co., Tacony & Fraley Sts., Philadelphia, Pa.
Atkins, E. C., & Co., 427 So. Illinois St., Indianapolis, Ind.
Bay State Abrasive Products Co., Westboro, Mass.
Blanchard Machine Co., The, 64 State St., Cambridge, Mass.
Carborundum Co., The, Niagara Falls, N. Y.
DeSanno, A. P., & Son Inc., 436 Wheatland St., Phoenixville, Pa.
Macklin Co., Jackson, Mich.
Norton Co., Worcester, Mass.
Sterling Grinding Wheel Div. Cleveland Quarries Co., Tiffin, O.

GRINDING WHEELS (Segmental)
Abrasive Co., Tacony & Fraley Sts., Philadelphia, Pa.
Blanchard Machine Co., The, 64 State St., Cambridge, Mass.
Carborundum Co., The, Niagara Falls, N. Y.
Macklin Co., Jackson, Mich.
Norton Company, Worcester, Mass.
Sterling Grinding Wheel Div. Cleveland Quarries Co., Tiffin, O.

GUIDE SHOES
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

GUIDES (Mill)
Ampco Metal, Inc., Dept. S-2, 3830 W. Burnham St., Milwaukee, Wis.
National-Erie Corp., Erie, Pa.
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

GUNS (Blast Furnace Mud)
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.
Brosius, Edgar E., Co., Sharpsburg Branch, Pittsburgh, Pa.

GUNS (Steam, Hydraulic, Electric)
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.
Brosius, Edgar E., Co., Sharpsburg Branch, Pittsburgh, Pa.

HAMMERS (Drop)
Alliance Machine Co., The, Alliance, Ohio.
Chambersburg Engineering Co., Chambersburg, Pa.
Erie Foundry Co., Erie, Pa.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.

HAMMERS (Power)
Yoder Co., The, W. 55th St. & Walworth Ave., Cleveland, O.

HAMMERS (Steam)
Alliance Machine Co., The, Alliance, Ohio.
Chambersburg Engineering Co., Chambersburg, Pa.
Erie Foundry Co., Erie, Pa.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.

HANGERS
Ahlberg Bearing Co., 3015 W. 47th St., Chicago, Ill.
Grinnell Co., Inc., Providence, R. I.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.

HANGERS (Shaft)
Bantam Bearings Corp., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Bearings Division, General Motors Corp., Harrison, N. J.
New Departure Div., General Motors Corp., Bristol, Conn.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.

HEADING MACHINERY
National Machinery Co., Tiffin, O.

HEAT TREATING
Lakeside Steel Improvement Co., The, 5418 Lakeside Ave., Cleveland, O.
Van Dorn Iron Works, 2685 E. 79th St., Cleveland, O.

HEAT TREATING MATERIALS
Houghton, E. F., & Co., Third, American & Somerset Sts., Philadelphia, Pa.
Park Chemical Co., 8076 Military Ave., Detroit, Mich.

HEATERS (Air)
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.

HEATERS (Electric Space)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.

HEATERS (Unit)
Dravo Corp. (Machinery Div.), 300 Penn Ave., Pittsburgh, Pa.
Grinnell Co., Inc., Providence, R. I.

HELMETS (Blast Cleaning)
Pangborn Corp., Hagerstown, Md.

HITCHINGS (Mine Car)
American Chain & Cable Co., Inc., Bridgeport, Conn.

HOBS
Brown & Sharpe Mfg. Co., Providence, R. I.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.

HOISTS (Chain)
Cleveland Tramrail Div., of Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Ford Chain Block Div. of American Chain & Cable Co., Inc., 2nd & Diamond Sts., Philadelphia, Pa.
Reading Chain & Block Co., Dept. D-3, Reading, Pa.
Wright Mfg. Div. of American Chain & Cable Co., Inc., York, Pa.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

HOISTS (Electric)
American Engineering Co., 2484 Aramingo Ave., Philadelphia, Pa.
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Economy Engineering Co., 2657 W. Van Buren St., Chicago, Ill.
Euclid Crane & Hoist Co., The, Chardon Rd., Euclid, Ohio.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Reading Chain & Block Corp., Dept. D-3, Reading, Pa.
Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc., 406 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
Silent Hoist Winch & Crane Co., 849 63rd St., Brooklyn, N. Y.
Wright Mfg. Div. of American Chain & Cable Co. Inc., York, Pa.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

HOISTS (Hand)
Economy Engineering Co., 2657 W. Van Buren St., Chicago, Ill.

HOISTS (Monorail)
American Engineering Co., 2484 Aramingo Ave., Philadelphia, Pa.
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Euclid Crane & Hoist Co., The, Chardon Rd., Euclid, Ohio.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Reading Chain & Block Corp., Dept. D-3, Reading, Pa.
Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc., 406 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

HOISTS (Pneumatic)
Curtis Pneumatic Machinery Div. of Curtis Mfg. Co., 1996 Kienlen Ave., St. Louis, Mo.
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.

HONING MACHINES
Micromatic Hone Corp., 1345 E. Milwaukee Ave., Detroit, Mich.

HOOKS (Chain)
American Chain & Cable Co., Inc., Bridgeport, Conn.

HOOPS AND BANDS
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Stanley Works, The, New Britain, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

HOSE REINFORCEMENT MACHINES
Fidelity Machine Co., 3908-18 Frankford Ave., Philadelphia, Pa.

HOSE (Flexible Metal)
American Metal Hose Branch of The American Brass Co., Waterbury, Conn.
Chicago Metal Hose Corp., 1315 S. Third St., Maywood, Ill.

HUMIDIFIERS (Industrial)
Grinnell Co., Inc., Providence, R. I.

HYDRAULIC MACHINERY
Alliance Machine Co., The, Alliance, Ohio.
Allis-Chalmers Mfg. Co., Milwaukee, Wis.

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Chambersburg Engineering Co., Chambersburg, Pa.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Farquhar, A. B., Co., Ltd., 175 Duke St., York, Pa.
Hanniffin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Morgan Engineering Co., The, Alliance, O.
National-Erie Corp., Erie, Pa.
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.
Weinman Pump & Supply Co., The, 210 Boulevard of the Allies, Pittsburgh, Pa.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

HYDRAULIC PRESSES—See PRESSES (Hydraulic)

HYDRAULIC UNITS
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Racine Tool & Machine Co., Racine, Wis.
Weinman Pump & Supply Co., The, 210 Boulevard of the Allies, Pittsburgh, Pa.

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Brosius, Edgar E., Co., Sharpsburg Branch, Pittsburgh, Pa.

INDICATORS (Temperature)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

INGOT MOLD WASH (Graphite)
United States Graphite Co., The, Saginaw, Mich.

INGOT MOLDS
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Shenango-Penn Mold Co., Oliver Bldg., Pittsburgh, Pa.
Valley Mould & Iron Corp., Hubbard, O.

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Parkin, Wm. M., Co., The, 1005 Highland Bldg., Pittsburgh, Pa.

INSTRUMENTS (Electric-Indicating and Recording)
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Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
General Electric Co., Schenectady, N. Y.
Graybar Electric Co., 420 Lexington Ave., New York City.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

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Johns-Manville Corp., 22 E. 40th St., New York City.
Ramtite Co., The, Div. of the S. Obermayer Co., 2537 W. 18th St., Chicago, Ill.

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Johns-Manville Corp., 22 E. 40th St., New York City.
Ramtite Co., The, Div. of the S. Obermayer Co., 2537 W. 18th St., Chicago, Ill.

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Atlas Lumnite Cement Co., Dept. S, Chrysler Bldg. New York City.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Johns-Manville Corp., 22 E. 40th St., New York City.

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Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Johns-Manville Corp., 22 E. 40th St., New York City.
Ramtite Co., The, Div. of the S. Obermayer Co., 2537 W. 18th St., Chicago, Ill.

INSULATION (Building)
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INSULATION (Furnace, Boiler Settings, Ovens, Steam Pipe, Etc.)
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IRON (Bar)
Ryerson, Jos. T., & Son Co., 16th & Rockwell Sts., Chicago, Ill.

IRON ORE
Alan Wood Steel Co., Conshohocken, Pa.
Cleveland-Cliffs Iron Co., Union Commerce Bldg., Cleveland, O.
Hanna Furnace Corp., The, Ecorse, Detroit, Mich.
Pickands Mather & Co., Union Commerce Bldg., Cleveland, O.
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Snyder, W. P., & Co., Oliver Bldg., Pittsburgh, Pa.
Youngstown Sheet & Tube Co., The, Youngstown, O.

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Bryant Machinery & Engineering Co., 400 W. Madison St., Chicago, Ill.
Cleereman Machine Tool Co., Green Bay, Wis.

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Columbus Die, Tool & Mach. Co., 955 Cleveland Ave., Columbus, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.

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Moltrup Steel Products Co., Beaver Falls, Pa.

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American Shear Knife Co., 3rd and Ann Sts., Homestead, Pa.
Atkins, E. C., & Co., 427 So. Illinois St., Indianapolis, Ind.
Cowles Tool Co., 2086 W. 110th St., Cleveland, O.
Disston, Henry, & Sons, Inc., 326 Tacony, Philadelphia, Pa.
Ohio Knife Co., Dreman Ave. & B. & O. R.R., Cincinnati, O.

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Dietert, Harry W., Co., 9330J Roselawn Ave., Detroit, Mich.

LABORATORY WARE
Bay State Abrasive Products Co., Westboro, Mass.
Norton Company, Worcester, Mass.

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Pollock, Wm. B., Co., The, 101 Andrews Ave., Youngstown, O.

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Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
National Broach & Machine Co., 5600 St. Jean, Detroit, Mich.
Norton Company, Worcester, Mass.

LARRIES (Coal)
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
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McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

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Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

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Jones & Lamson Machine Co., Springfield, Vt.
LeBlond, R. K., Machine Tool Co., Dept. J-2, Cincinnati, O.
Monarch Machine Tool Co., Sidney, O.
Morey Machinery Co., Inc., 410 Broome St., New York City.
South Bend Lathe Works, 860 E. Madison St., South Bend, Ind.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, O.

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Brown & Sharpe Mfg. Co., Providence, R. I.
Gisholt Machine Co., 1217 E. Washington Ave., Madison, Wis.
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Wean Engineering Co., Warren, O.
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Whitcomb Locomotive Co., Rochelle, Ill.
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United States Graphite Co., The, Saginaw, Mich.
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American Lanolin Corp., Railroad St., Lawrence, Mass.
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Shell Oil Co., Inc., 50 W. 50th St., New York City.
Socony-Vacuum Oil Co., Inc., 26 Broadway, New York City.
Stuart, D. A., Oil Co., Ltd., 2733 So. Troy St., Chicago, Ill.
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Wayne Chemical Products Co., 9502 Copeland St., Detroit, Mich.
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METAL STAMPINGS—See STAMPINGS
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Reading Chain & Block Corp., Dept. D-3, Reading, Pa.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
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Fairbanks, Morse & Co., Dept. D75, 600 So. Michigan Ave., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Graybar Electric Co., 420 Lexington Ave., New York City.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Lincoln Electric Co., The, Cleveland, O.
Reliance Electric & Eng. Co., 1081 Ivanhoe Rd., Cleveland, O.
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Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

RACKS (Portable)
Union Steel Products Co., 437 Pine St., Albion, Mich.

RACKS (Steel, for Drums & Barrels)
Economy Engineering Co., 2657 W. Van Buren St., Chicago, Ill.

RAIL BREAKERS
National Roll & Foundry Co., The, Avonmore, Pa.
United Engineering & Fdry Co., First National Bank Bldg., Pittsburgh, Pa.

RAILS (New and Relaying)
Foster, L. B., Co., Inc., P. O. Box 1647, Pittsburgh, Pa.

RAILS (Steel)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Ryerson, Jos. T. & Son, Inc., 16th & Rockwell Sts., Chicago Ill
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va

REAMERS
Blanchard Machine Co., The, 64 State St., Cambridge, Mass.
Brown & Sharpe Mfg. Co., Providence, R. I.
Cleveland Twist Drill Co., The, 1242 E. 49th St., Cleveland, O.
Gisholt Machine Co., 1217 E. Washington Ave., Madison, Wis.
Greenfield Tap & Die Corp., Greenfield, Mass.

REBUILT EQUIPMENT
Albert, L., & Son, Whitehead Rd Trenton, N. J.
Crawbuck, John D., Co., Empire Bldg., Pittsburgh, Pa.
Galbreath Machinery Co., Empire Bldg., Pittsburgh Pa.
General Blower Co., 404 N. Peoria St., Chicago, Ill.
Iron & Steel Products, Inc 13 Hegewisch Sta., Chicago Ill.
Lang Machinery Co., 28th & A.V.R.R., Pittsburgh, Pa.
Motor Repair & Mfg. Co., 1558 Hamilton Ave., Clevsland, O
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Scaife Co., Ames St., Oakmont, Pa.

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Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.

RECORDERS (Pressure, Speed, Temperature, Time)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

RECTIFIERS (Dry Disc)
Mallory, P. R., & Co., 3029 E. Washington Ave., Indianapolis, Ind.

REDUCERS (Speed)—See SPEED REDUCERS

REDUCTION GEARS
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
National-Erie Corp., Erie, Pa.
Philadelphia Gear Works, Erie Ave. & G St., Philadelphia, Pa.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.

REFRACTORIES (Dolomite)
Basic Refractories, Inc., Hanna Bldg., Cleveland, O.

REFRACTORIES (Fire Clay)
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Eureka Fire Brick Co., 1100 B. F. Jones Law Bldg., Pittsburgh, Pa.
Globe Brick Co., The, East Liverpool, O.
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh, Pa.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Keagler Brick Co., 1443 W. Market St., Steubenville, O.
Ramtite Co., The, Div. of the S. Obermayer Co., 2557 W. 18th St., Chicago, Ill.

REFRACTORIES (For High Frequency Furnaces)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Carborundum Co., The, Perth Amboy, N. J.
Norton Co., Worcester, Mass.
Titanium Alloy Mfg. Co., The, Niagara Falls, N. Y.

REFRACTORIES (Silicon Carbide)
Bay State Abrasive Products Co., Westboro, Mass.
Carborundum Co., The, Perth Amboy, N. J.
Norton Co., Worcester, Mass.

REFRACTORY CONCRETE
Atlas Lumnite Cement Co., Dept. S, Chrysler Bldg., New York City.
Johns-Manville Corp., 22 E. 40th St., New York City.

REGULATORS (Pressure)
Electric Controller & Mfg. Co., The, 2700 E. 79th St., Cleveland, O.

REGULATORS (Temperature)
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Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

REINFORCEMENT FABRIC (Electric Welded)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.

RESISTORS (Edgewound)
Clark Controller Co., The, 1146 E. 152nd St., Cleveland, O.

RESISTORS (Graphite Disc)
Allen-Bradley Co., 1320 So. 2nd St., Milwaukee, Wis.

RHEOSTATS (Plating)
Electric Controller & Mfg. Co., The, 2700 E. 79th St., Cleveland, O.
Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

RINGS (Steel)
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Heppenstall Co., Box 8-4, 4620 Hatfield St., Pittsburgh, Pa.
King Fifth Wheel Co., 2915 No. Second St., Philadelphia, Pa.
Moltrup Steel Products Co., Beaver Falls, Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.

RINGS (Weldless)
(*Also Stainless)
*Midvale Co., The, Nicetown, Philadelphia, Pa.

RIVET SETS
Pittsburgh Saw & Tool Co., 75-81 Sycamore St., Etna P. O., Pittsburgh, Pa.

RIVETERS (Hydraulic—Portable and Stationary)
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

RIVETERS (Pneumatic)
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

RIVETING MACHINERY
Chambersburg Engineering Co., Chambersburg, Pa.
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Shuster, F. B., Co., The, New Haven, Conn.
Tomkins-Johnson Co., (Dept. S), 611 N. Mechanic St., Jackson, Mich.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

RIVETS
(*Also Stainless)
Bethlehem Steel Co., Bethlehem, Pa.
Hassall, John, Inc., 402 Oakland St., Brooklyn, N. Y.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Oliver Iron & Steel Corp., So. 10th & Muriel Sts., Pittsburgh, Pa.
*Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
*Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Triplex Screw Co., The, 5317 Grant Ave., Cleveland, O.

RIVETS (Non-Ferrous and Stainless)
Harper, H. M., Co., The 2646 Fletcher St., Chicago, Ill.

RODS (Alloy)
Ampco Metal, Inc., Dept. S-2, 3830 W. Burnham St., Milwaukee, Wis.
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Copperweld Steel Co., Warren, O.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Republic Steel Corp., Dept. ST. Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.

RODS (Brass, Bronze, Copper, Nickel Silver, Silicon-Bronze)
American Brass Co., The, Waterbury, Conn.
Bridgeport Brass Co., Bridgeport, Conn.
Roebling's, John A., Sons Co., Trenton, N. J.
Seymour Manufacturing Co., The, Seymour, Conn.

RODS (Drill)
Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Fraase, Peter A., & Co., Inc. 17 Grand St., New York City
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.

RODS (Phosphor Bronze)
Seymour Manufacturing Co., The, Seymour, Conn.

RODS (Rounds, Flats and Shapes)
(*Also Stainless)
*Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
*American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
*Copperweld Steel Co., Warren, O.
*Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
*Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Washburn Wire Co., Phillipsdale, R. I.
Youngstown Sheet & Tube Co., The, Youngstown, O.

RODS (Steel and Iron)
Firth-Sterling Steel Co., McKeesport, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.

RODS (Welding)—See WELDING RODS

RODS (Wire)—See WIRE PRODUCTS

ROLL FORMING MACHINES
Etna Machine Co., The, 3400 Maplewood Ave., Toledo, O.

ROLLING DOORS & SHUTTERS—See DOORS AND SHUTTERS

ROLLING MILL BEARINGS—See BEARINGS (Rolling Mill)

ROLLING MILL EQUIPMENT
Alliance Machine Co., The Alliance, Ohio
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Cold Metal Products Co., The, 2131 Wilson Ave., Youngstown, O.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Monessen Foundry & Machine Co., Monessen, Pa.
Morgan Construction Co., Worcester, Mass.
Morgan Engineering Co., The, Alliance, O.
National Roll & Foundry Co., The, Avonmore, Pa.
Streine Tool & Mfg. Co., New Bremen, O.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Wean Engineering Co., Warren, O.
Yoder Co., The, W. 55th St. & Walworth Ave., Cleveland, O.

ROLLING MILLS (Consulting, Contracting Engineers)
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.

ROLLING MILL MACHINERY (Used)
Frank B. Foster, Oliver Bldg., Pittsburgh, Pa.

ROLLING MILL TABLES
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.

ROLLS (Bending and Straightening)
Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Webb City & Carterville Foundry & Machine Works, Webb City, Mo.

ROLLS (Sand and Chilled)
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
National Roll & Foundry Co., The, Avonmore, Pa.
Ohio Steel Fdry. Co., Lima, O. Springfield, O.
Pittsburgh Rolls Div. of Blaw-Knox Co., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

ROLLS (Steel and Iron)
Bethlehem Steel Co., Bethlehem, Pa.
Birdsboro Steel Fdry. & Mach. Co. Birdsboro, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Hyde Park Fdry. and Machine Co., Hyde Park, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Roll & Fdry. Co., The, Avonmore, Pa.
Ohio Steel Fdry. Co., Lima, O.-Springfield, O.
United Engineering & Fdry Co., First National Bank Bldg., Pittsburgh, Pa.

ROLLS (Tinning Machine)
American Shear Knife Co., 3rd & Ann Sts., Homestead, Pa.

ROOFING AND SIDING
Johns-Manville Corp., 22 E. 40th St., New York City.

ROOFING AND SIDING (Corrugated and Plain)
American Rolling Mill Co., The, 991 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carey, Philip, Co., The, Lockland, Cincinnati, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
New Jersey Zinc Co., 160 Front St., New York City.
Republic Steel Corp., Dept. ST, Cleveland, O.
Robertson, H. H., Co., Farmers Bank Bldg., Pittsburgh, Pa.
Ryerson, Jos. T., & Sons, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

ROOFING (Plastic and Liquid)
Carey, Philip, Co., The, Lockland, Cincinnati, O.
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.

RUBBER LINING (Hard and Soft)
American Hard Rubber Co., 11 Mercer St., New York City.

RUST PREVENTIVES
Alrose Chemical Co., 80 Clifford St., Providence, R. I.
American Lanolin Corp., Railroad St., Lawrence, Mass.
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.
Smith Oil & Refining Co., Rockford, Ill.
Wayne Chemical Products Co., 9502 Copeland St., Detroit, Mich.

RUST PROOFING PROCESS
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.
Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

SAFE ENDS (Boiler Tube)
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Tubular Service Corp., 120 44th St., Brooklyn, N. Y.

SAFETY DEVICES (Electric)
Electric Controller & Mfg. Co., The, 2700 E. 79th St., Cleveland, O.

SALT TABLETS
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SAND CONDITIONING AND PREPARING MACHINERY
American Foundry Equipment Co., The, Mishawaka, Ind.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

SAWING MACHINES (Hack)
Racine Tool & Machine Co., Racine, Wis.

SAWING MACHINES (Hot and Cold)
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Motch & Merryweather Machinery Co., Penton Bldg., Cleveland, O.
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Racine Tool & Machine Co., Racine, Wis.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

SAWING MACHINES (Contour)
Continental Machines, Inc., 1324 So. Washington Ave., Minneapolis, Minn.

SAWS (Band—Metal Cutting)
Atkins, E. C., & Co., 427 So. Illinois St., Indianapolis, Ind.
Disston, Henry, & Sons, Inc., 326 Tacony, Philadelphia, Pa.
Huther Bros. Saw & Mfg. Co., 1290 University Ave., Rochester, N. Y.
Simonds Saw & Steel Co., 470 Main St., Fitchburg, Mass.

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Disston, Henry & Sons, Inc., 326 Tacony, Philadelphia, Pa.
Simonds Saw & Steel Co., 470 Main St., Fitchburg, Mass.

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Huther Bros. Saw & Mfg. Co., 1290 University Ave., Rochester, N. Y.
Pittsburgh Saw & Tool Co., 78-80 Sycamore St., Etna P. O. Pittsburgh, Pa.
Simonds Saw & Steel Co., 470 Main St., Fitchburg, Mass.

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Atkins, E. C., & Co., 402 So. Illinois St., Indianapolis, Ind.
Brown & Sharpe Mfg. Co., Providence, R. I.
Disston, Henry, & Sons, Inc., 326 Tacony, Philadelphia, Pa.
Motch & Merryweather Machinery Co., Penton Bldg., Cleveland, O.
Pittsburgh Saw & Tool Co., 78-80 Sycamore St., Etna P. O., Pittsburgh, Pa.
Simonds Saw & Steel Co., 470 Main St., Fitchburg, Mass.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SAWS (Segmental)
Atkins, E. C., & Co., 427 So. Illinois St., Indianapolis, Ind.
Disston, Henry, & Sons, Inc., 326 Tacony, Philadelphia, Pa.
Motch & Merryweather Machinery Co., Penton Bldg., Cleveland, O.
Pittsburgh Saw & Tool Co., 78-80 Sycamore St., Etna P. O., Pittsburgh, Pa.

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Fairbanks, Morse & Co., Dept. D75, 600 So. Michigan Ave., Chicago, Ill.
Kron Co., The, Bridgeport, Conn.

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Fairbanks, Morse & Co., Dept. D75, 600 S. Michigan Ave., Chicago, Ill.

SCALES (Laboratory)
Fairbanks, Morse & Co., Dept. C75,
Fairbanks, Morse & Co., Dept. D75,

SCALES (Monorail)
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Fairbanks, Morse & Co., Dept. D75, 600 So. Michigan Ave., Chicago, Ill.
Kron Co., The, Bridgeport, Conn.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

SCRAP BALING PRESSES—See BALING PRESSES

SCRAP (Iron & Steel)
Hyman-Michaels Co., 122 S. Michigan Ave., Chicago, Ill.

SCREENS AND SIEVES
Chicago Perforating Co., 2443 W. 24th Pl., Chicago, Ill.
Erdle Perforating Co., 171 York St., Rochester, N. Y.
Harrington & King Perforating Co., 5634 Fillmore St., Chicago, Ill.
Koppers Co., Engineering & Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.

SCREW EXTRACTORS
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SCREW MACHINE PRODUCTS
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Hindley Mfg. Co., Valley Falls, R. I.
National Acme Co., The, 170 E. 131st St., Cleveland, O.
Oliver Iron & Steel Corp. So. 10th & Muriel Sts., Pittsburgh, Pa.

SCREW MACHINES (Automatic, Single and Multiple Spindle)
Brown & Sharpe Mfg. Co., Providence, R. I.
Cleveland Automatic Machine Co., 2269 Ashland Ave., Cleveland, O.
Cone Automatic Machine Co., Inc., Windsor, Vt.
National Acme Co., The, 170 E. 131st St., Cleveland, O.
Oster Mfg. Co., The, 2037 E. 61st St., Cleveland, O.

SCREW PLATES
Greenfield Tap & Die Corp., Greenfield, Mass.

SCREW STOCK—See STEEL (Screw Stock)

SCREWS
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Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Parker-Kalon Corp., 194-200 Varick St., New York City.

SCREWS (Cap, Set, Safety-Set)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Cleveland Cap Screw Co., 2930 E. 79th St., Cleveland, O.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Acme Co., The, 170 E. 131st St., Cleveland, O.
Parker-Kalon Corp., 194-200 Varick St., New York City
Triplex Screw Co., The, 5317 Grant St., Cleveland, O.

SCREWS (Cold Headed)
Central Screw Company, 3517 Shields Ave., Chicago, Ill.
Cleveland Cap Screw Co., 2930 E. 79th St., Cleveland, O.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.

SCREWS (Conveyor)
Lee Spring Co. Inc., 30 Main St., Brooklyn, N. Y.

SCREWS (Drive)
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O
Parker-Kalon Corp., 194-200 Varick St., New York City.

SCREWS (Hardened Self-Tapping)
Central Screw Company, 3517 Shields Ave., Chicago, Ill.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O
Parker-Kalon Corp., 194-200 Varick St., New York City.

SCREWS (Machine)
Central Screw Company, 3517 Shields Ave., Chicago, Ill.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Triplex Screw Co., The, 5317 Grant Ave., Cleveland, O.

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American Screw Co., Providence, R. I.
Bristol Co., Waterbury, Conn.
Central Screw Co., Chicago, Ill.
Chandler Products Co., Euclid, O.
Continental Screw Co., New Bedford, Mass.
Corbin Screw Corp., New Britain, Conn.
International Screw Co., Detroit, Mich.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Screw & Mfg. Co., 2440 E. 75th St., Cleveland, O.
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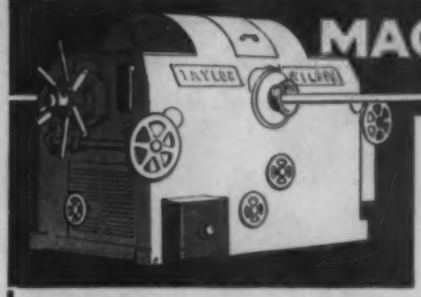

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Scovill Mfg. Co., Waterbury, Conn.

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American Screw Co., Providence, R. I.
Bristol Co., Waterbury, Conn.
Central Screw Co., Chicago, Ill.
Chandler Products Co., Euclid, O
Continental Screw Co., New Bedford, Mass.
Corbin Screw Corp., New Britain, Conn.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Screw & Mfg. Co., 2440 E. 75th St., Cleveland, O
Parker-Kalon Corp., 194-200 Varick St., New York City.
Pheoli Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Shakeproof Lock Washer Co., Chicago, Ill.

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Parker-Kalon Corp., 194-200 Varick St., New York City.

SCREWS (Thread-Cutting)
Parker-Kalon Corp., 194-200 Varick St., New York City

SCREWS (Thumb)
Central Screw Company, 3517 Shields Ave., Chicago, Ill.
Parker-Kalon Corp., 194-200 Varick St., New York City.

SCREWS (Wood, Recessed Head)
American Screw Co., Providence, R. I.
Bristol Co., Waterbury, Conn.
Chandler Products Co., Euclid, O.
Continental Screw Co., New Bedford, Mass.
Corbin Screw Corp., New Britain, Conn.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Screw & Mfg. Co., 2440 E. 75th St., Cleveland, O.
Parker, Charles, Co., The, Meriden, Conn.
Pheoli Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.
Southington Hdwe. Mfg. Co., Pawtucket, R. I.
Whitney Screw Co., Nashua, N. H.

SEAMLESS STEEL TUBING—See TUBES

SEPARATORS (Magnetic)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Electric Controller & Mfg. Co., The, 2700 E. 79th St., Cleveland, O.
Frantz, S. G., Co., Inc., 221-5 Centre St., New York City.
Ohio Electric Mfg. Co., The, 5806 Maurice Ave., Cleveland, O.

SHAFT HANGERS—See HANGERS (Shaft)

SHAFTING
Bliss & Laughlin, Inc., Harvey, Ill
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
LaSalle Steel Co., Chicago, Ill.
Moltrup Steel Products Co., Beaver Falls, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Scully Steel Products Co., 1316 Wabansia Ave., Chicago, Ill.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Union Drawn Steel Div. Republic Steel Corp., Massillon, O.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

SHAFTING (Flexible)
Walker-Turner Co., Inc., 5042 Berckman St., Plainfield, N. J.

SHAPERS
Cincinnati Shaper Co., Garrard and Elam Sts. Cincinnati, O.

SHAPERS (Automatic Controls for)
Detroit Universal Duplicator Co., 218 St. Aubin, Detroit, Mich.

SHAPES (Brass, Bronze, Nickel, Silver)
Dahlstrom Metallic Door Co., Jamestown, N. Y.

SHAPES (Steel)—See STEEL (Structural)

SHAPES, SPECIAL (Steel)
Bliss & Laughlin, Inc., Harvey, Ill
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Dahlstrom Metallic Door Co., Jamestown, N. Y.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.
Roebling's, John A., Sons Co., Trenton, N. J.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Union Drawn Steel Div. Republic Steel Corp., Massillon, O.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

SHEAR BLADES
American Shear Knife Co., 3rd and Ann Sts., Homestead, Pa
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Disston, Henry, & Sons, Inc., 326 Tacony, Philadelphia, Pa.
Heppenstall Co., Box 8-4, 4620 Hatfield St., Pittsburgh, Pa.
Ohio Knife Co., Dreman Ave. & B. & O. R.R., Cincinnati, O.

SHEARS
Beatty Machine & Mfg. Co., Hammond, Ind.
Cincinnati Shaper Co., Garrard and Elam Sts., Cincinnati, O.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Haliden Machine Co., The, Thomaston, Conn.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
Lewis Fdry. & Mach. Div. of Blaw Knox Co., Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Streine Tool & Mfg. Co., New Bremen, O.
Thomas Machine Mfg. Co., Etna Branch P. O., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

SHEARS, ROTARY (Slitting, Beveling, Circling, Flanging)
Yoder Co., The, W. 55th St. & Walworth Ave., Cleveland, O.

SHELL BANDS (Rotating)
Lewin-Mathes Co., E. St. Louis, Ill.

SHEET BARS
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEET LIFTERS AND CARRIERS
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cullen-Friestedt Co., 1308 S. Kilbourn Ave., Chicago, Ill.
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
J-B Engineering Sales Co., 1743 Orange St., New Haven, Conn.

SHEET METAL PRODUCTS—See STAMPINGS

SHEET METAL WORKERS MACHINES
Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, O.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Streine Tool & Mfg. Co., New Bremen, O.
Yoder Co., The, W. 55th St. & Walworth Ave., Cleveland, O.

SHEET STEEL PILING (New and Used)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Foster, L. B., Co., Inc., P. O. Box 1647, Pittsburgh, Pa.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.

SHEETS (Acid Resisting)
International Nickel Co., Inc., The, 67 Wall St., New York City.

SHEETS (Black)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Andrews Steel Co., The, Newport, Ky.
Continental Steel Corp., Kokomo, Ind.
Granite City Steel Co., Granite City, Ill.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Superior Sheet Steel Div., Continental Steel Corp., Canton, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

SHEETS (Brass, Bronze, Copper, Nickel Silver, Silicon-Bronze)
American Brass Co., The, Waterbury, Conn.
Ampco Metal, Inc., Dept. S-2, 3830 W. Burnham St., Milwaukee, Wis.
Bridgeport Brass Co., Bridgeport, Conn.

SHEETS (Corrugated)
American Rolling Mill Co., The, 991 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., 2243-2244 Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Superior Sheet Steel Div., Continental Steel Corp., Canton, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Deep Drawing and Stamping)
Alan Wood Steel Co., Conshohocken, Pa.
American Rolling Mill Co., The 991 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., 2243-2244 Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Granite City Steel Co., Granite City, Ill.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Electrical)
Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The, 991 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Granite City Steel Co., Granite City, Ill.
Ingersoll Steel & Disc. Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Wheeling Steel Corp., Wheeling, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Galvanized)
American Rolling Mill Co., The, 991 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., 2243-2244 Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Scully Steel Products Co., 1316 Wabansia Ave., Chicago, Ill.
Superior Sheet Steel Div., Continental Steel Corp., Canton, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wheeling Steel Corp., Wheeling, W. Va.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Hot Rolled and Hot Rolled Annealed)
Alan Wood Steel Co., Conshohocken, Pa.
American Rolling Mill Co., The, 991 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., 2243-2244 Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Disston, Henry, & Sons, Inc., 326 Tacony, Philadelphia, Pa.
Granite City Steel Co., Granite City, Ill.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Levinson Steel Co., 33 Pride St., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Scully Steel Products Co., 1316 Wabansia Ave., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wheeling Steel Corp., Wheeling, W. Va.
Weirton Steel Co., Weirton, W. Va.
Worth Steel Co., Claymont, Del.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Lead Coated)
Continental Steel Corp., Kokomo, Ind.
Superior Sheet Steel Div., Continental Steel Corp., Canton, O.

WHERE-TO-BUY

SHEETS (Long Terne)
Andrews Steel Co., The, Newport, Ky.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Steel Corp., Kokomo, Ind.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Superior Sheet Steel Div., Continental Steel Corp.,
Weirton Steel Co., Weirton, W. Va.
Wheeling Steel Corp., Wheeling, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Nickel Silver)
Seymour Manufacturing Co., The, Seymour, Conn.

SHEETS (Perforated)
Harrington & King Perforating Co., 5634 Fillmore St., Chicago, Ill.

SHEETS (Phosphor Bronze)
Seymour Manufacturing Co., The, Seymour, Conn.

SHEETS (Reinforced)
Erdle Perforating Co., 171 York St., Rochester, N. Y.

SHEETS (Roofing)—See ROOFING AND SIDING

SHEETS (Stainless)
Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The, 991 Curtis St., Middletown, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Republic Steel Corp., Massillon, O
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.

SHEETS (Stainless Clad)
Granite City Steel Co., Granite City, Ill.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.

SHEETS (Tin)—See TIN PLATE

SHEETS (Tin Mill Black)
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.

SHEETS—HIGH FINISH (Automobile, Metal Furniture, Enameling)
American Rolling Mill Co., The, 991 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., 2243-2244 Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wheeling Steel Corp., Wheeling, W. Va.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHELL BANDS (Rotating)
Lewin-Mathes Co., East St. Louis, Mo.

SHELLS (Seamless Drawn)
Crosby Co., The, 183 Pratt St., Buffalo, N. Y.

SHOVELS (Power)
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.

SIEVES—See SCREENS AND SIEVES

SIGNALING & INTER-COMMUNICATION EQUIPMENT
Graybar Electric Co., 420 Lexington Ave., New York City.

SIGNS (Metal)
Webb City & Carterville Foundry & Machine Works, Webb City, Mo.

SILICO-MANGANESE
Electro Metallurgical Co., 30 E. 42nd St., New York City
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa

SILICON METAL AND ALLOYS
Electro Metallurgical Co., 30 E. 42nd St., New York City.
Revere Copper & Brass, Inc., 222 Park Ave., New York City.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

SKELP (Steel)
Alan Wood Steel Co., Conshohocken, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

SLAG GRANULATING MACHINES (Blast Furnace and Open Hearth)
Broslus, Edgar E., Co., Sharpsburg Branch, Pittsburgh, Pa.

SLITTERS
Cowles Tool Co., 2086 W. 110th St., Cleveland, O.
Ohio Knife Co., Dreman Ave. & B. & O. R.R., Cincinnati, O.

SMALL TOOLS
Brown & Sharpe Mfg. Co., Providence, R. I.
Cleveland Twist Drill Co., The, 1242 E. 49th St., Cleveland, O.

SOAKING PITS
Amsler-Morton Co., The, Fulton Bldg., Pittsburgh, Pa.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Surface Combustion Div., 2375 Dorr St., Toledo, O.

SOLDER
Kester Solder Co., 4222 Wrightwood Ave., Chicago, Ill.
Wayne Chemical Products Co., 9502 Copeland St., Detroit, Mich.

SOLENOIDS (Electric)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.

SOLVENT (Degreasing)
Pennsylvania Salt Mfg. Co., Dept. S, Pennsalt Cleaner Div., Philadelphia, Pa.

SPACING TABLES
Thomas Machine Mfg. Co., Etna Branch P. O., Pittsburgh, Pa.

SPECIAL MACHINERY—See MACHINERY (Special)

SPEED REDUCERS
Cleveland Worm & Gear Co., 3270 E. 80th St., Cleveland, O.
Grant Gear Works, 2nd & B. Sts., Boston, Mass.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
James, D. O., Mfg. Co., 1120 W. Monroe St., Chicago, Ill.
Jones, W. A., Fdry. & Mach. Co., 4437 Roosevelt Rd., Chicago, Ill.
Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia, Pa.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.
New Departure Div., General Motors Corp., Bristol, Conn.
Philadelphia Gear Works, Erie Ave. & G St., Philadelphia, Pa.

SPIEGELEISEN
Electro Metallurgical Co., 30 E. 42nd St., New York City.
New Jersey Zinc Co., 160 Front St., New York City.
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Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SPINDLE SHAPERS (For Non-Ferrous Metal, Plastics & Wood)
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SPINDLES (Grinding)
Bryant Chucking Grinder Co., Springfield, Vt.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Heald Machine Co., Worcester, Mass.

SPINDLES (Lathe)
American Hollow Boring Co., 1084 W. 20th St., Erie, Pa.

SPLICE BARS (Rail)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

SPRINGS (*Also Stainless)
*American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
*Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Hubbard, M. D., Spring Co., 443 Central Ave., Pontiac, Mich.
Lee Spring Co., Inc., 30 Main St., Brooklyn, N. Y.
*Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Washburn Wire Co., 118th St. & Harlem River, New York City.

SPRINGS (Alloy)
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.

SPRINGS (Coil & Elliptic)
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.

SPRINGS (Compression)
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.

SPRINGS (Oil Tempered—Flat)
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Davis Brake Beam Co., Laurel Ave., & P. R. R., Johnstown, Pa.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.

SPRINGS (Torsion)
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.

SPRINGS (Valve)
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.

SPRINKLERS (Automatic)
Grinnell Co., Inc., Providence, R. I.

SPRUE CUTTERS
Shuster, F. B., Co., The, New Haven, Conn.

STACKS (Steel)—See BRIDGES, ETC.

STAINLESS STEEL—See BARS, SHEETS, STRIP, PLATES, ETC.

STACKING MACHINES (Hand & Electric)
Economy Engineering Co., 2657 W. Van Buren St., Chicago, Ill.

STAMPINGS
American Tube & Stamping Plant, (Stanley Wks.), Bridgeport, Conn.
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Crosby Co., The, 183 Pratt St, Buffalo, N. Y.
Dahlstrom Metallic Door Co., Jamestown, N. Y.
Davis Brake Beam Co., Laurel Ave., & P. R. R., Johnstown, Pa.
Dayton Rogers Co., Minneapolis, Minn.
Erdle Perforating Co., 171 York St., Rochester, N. Y.
Homestead Valve Mfg. Co., P. O. Box 20, Coraopolis, Pa.
Hubbard, M. D., Spring Co., 443 Central Ave., Pontiac, Mich.
Lyon Metal Products, Inc., 7203 Madison Ave., Aurora, Ill.
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.
Scaife Co., Ames St., Oakmont, Pa.
Stanley Works, The, Bridgeport, Conn. New Britain, Conn.
Toledo Stamping & Mfg. Co., 90 Fearing Blvd., Toledo, O.
Whitehead Stamping Co., 1667 W. Lafayette Blvd., Detroit, Mich.

STAMPS (Steel)
Cunningham, M. E., Co., 172 E. Carson St., Pittsburgh, Pa.
Matthews, James H., & Co., 3942 Forbes St., Pittsburgh, Pa.

STAPLES (Wire)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wickwire Brothers, 189 Main St., Cortland, N. Y.
Youngstown Sheet & Tube Co., The, Youngstown, O.

STARTERS (Electric Motor)
Electric Controller & Mfg. Co., The 2700 E. 79th St., Cleveland, O.

STEEL (Alloy)
Alan Wood Steel Co., Conshohocken, Pa.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Carpenter Steel Co., Dept. 51, Reading, Pa.
Columbia Steel Co., San Francisco, Calif.
Copperweld Steel Co., Warren, O.
Disston, Henry, & Sons, Inc., 326 Tacony, Philadelphia, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Frasse, Peter A., & Co., Inc. 17 Grand St., New York City
Heppenstall Co., Box 8-4, 4620 Hatfield St., Pittsburgh, Pa.
Jessop Steel Co., 584 Green St., Washington, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Scully Steel Products Co., 1316 Wabansia Ave., Chicago, Ill.
Simonds Saw & Steel Co., 470 Main St., Fitchburg, Mass.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Vanadium-Alloys Steel Co., Latrobe, Pa.
Washburn Wire Co., Phillipsdale, R. I.

STEEL (Alloy, Cold Finished)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bliss & Laughlin, Inc., Harvey, Ill.
Copperweld Steel Co., Warren, O.
Firth-Sterling Steel Co., McKeesport, Pa.
LaSalle Steel Co., Chicago, Ill.
Moltrup Steel Products Co., Beaver Falls, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Union Drawn Steel Div. of Republic Steel Corp., Massillon, O.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

STEEL (Clad—Corrosion Resisting) (*Also Stainless)
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Carpenter Steel Co., Dept. 51, Reading, Pa.
*Copperweld Steel Co., Warren, O. Room 117—405 Lexington Ave., New York City.
*Granite City Steel Co., Granite City, Ill.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Jessop Steel Co., 584 Green St., Washington, Pa.
Sharon Steel Corp., Sharon, Pa.
Superior Steel Corp., Carnegie, Pa.

STEEL (Cold Drawn)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bliss & Laughlin, Inc., Harvey, Ill.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Moltrup Steel Products Co., Beaver Falls, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Roebling's, John A., Sons Co., Trenton, N. J.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.
Union Drawn Steel Div. of Republic Steel Corp., Massillon, O.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

STEEL (Cold Finished)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
LaSalle Steel Co., Chicago, Ill.
Moltrup Steel Products Co., Beaver Falls, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Roebling's, John A., Sons Co., Trenton, N. J.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Scully Steel Products Co., 1316 Wabansia Ave., Chicago, Ill.
Union Drawn Steel Div. of Republic Steel Corp., Massillon, O.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

STEEL (Corrosion Resisting)
Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The, 991 Curtis St., Middletown, O.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Bissett Steel Co., The, 943 E. 67th St., Cleveland, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Carpenter Steel Co., Dept. 51, Reading, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Frasse, Peter A., & Co., Inc. 17 Grand St., New York City
Granite City Steel Co., Granite City, Ill.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jessop, Wm., & Sons, Inc., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Superior Steel Corp., Carnegie, Pa.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.

STEEL (Die)
Disston, Henry, & Sons, Inc., 326 Tacony, Philadelphia, Pa.
Jessop, Wm., & Sons, Inc., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Vanadium-Alloys Steel Co., Latrobe, Pa.

STEEL (Electric)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Copperweld Steel Co., Warren, O.
Disston, Henry, & Sons, Inc., 326 Tacony, Philadelphia, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jessop, Wm., & Sons, Inc., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Latrobe Electric Steel Co., Latrobe, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.

STEEL (High Speed)
Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carpenter Steel Co., Dept. 51, Reading, Pa.
Disston, Henry, & Sons, Inc., 326 Tacony, Philadelphia, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Jessop, Wm., & Sons Co., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Latrobe Electric Steel Co., Latrobe, Pa.
Vanadium-Alloys Steel Co., Latrobe, Pa.

STEEL (High Tensile, Low Alloy)
Alan Wood Steel Co., Conshohocken, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Cold Metal Products Co., The, 2131 Wilson Ave., Youngstown, O.
Columbia Steel Co., San Francisco, Calif.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

STEEL (Nitriding)
Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.

STEEL (Rustless)—See STEEL (Corrosion Resisting)

STEEL (Screw Stock)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.

WHERE-TO-BUY

STEEL (Screw Stock)—Con.
LaSalle Steel Co., Chicago, Ill.
Moltrup Steel Products Co., Beaver Falls, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Union Drawn Steel Div. of Republic Steel Corp., Massillon, O.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.
Youngstown Sheet & Tube Co., The, Youngstown, O.

STEEL (Spring)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Cold Metal Products Co., The, Wilson Ave., Youngstown, O.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.
Washburn Wire Co., 118th St. & Harlem River, New York City. Phillipsdale, R. I.

STEEL (Stainless)—See STEEL (Corrosion Resisting)

STEEL (Strapping)
Atkins, E. C., & Co., 427 So. Illinois St., Indianapolis, Ind.

STEEL (Strip, Copper Coated)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Thomas Steel Co., The, Warren, O. Rockefeller Bldg., Cleveland, O.

STEEL (Strip, Hot and Cold Rolled) (*Also Stainless)
*Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
*American Rolling Mill Co., The, 991 Curtis St., Middletown, O.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
American Tube & Stamping Plant, (Stanley Wks.), Bridgeport, Conn.
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Cold Metal Products Co., The, 2131 Wilson Ave., Youngstown, O.
Columbia Steel Co., San Francisco, Calif.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
*Firth-Sterling Steel Co., McKeesport, Pa.
Frasse, Peter A., & Co., Inc. 17 Grand St., New York City
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jessop, Wm., & Sons, Inc., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
*Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Scully Steel Products Co., 1316 Wabansia Ave., Chicago, Ill.
*Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Superior Steel Corp., Carnegie, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Thomas Steel Co., The, Warren, O.
Washburn Wire Co., 118th St. & Harlem River, New York City. Phillipsdale, R. I.
Weirton Steel Co., Weirton, W. Va.

STEEL (Strip, Tin Coated)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Thomas Steel Co., The, Warren, O.
Washburn Wire Co., 118th St. & Harlem River, New York City.

STEEL (Strip, Zinc Coated)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Thomas Steel Co., The, Warren, O.
Washburn Wire Co., 118th St. & Harlem River, New York City.

STEEL (Structural) (*Also Stainless)
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Belmont Iron Works, 22nd St. and Washington Ave., Philadelphia, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Clinton Bridge Works, Clinton, Ia.
Columbia Steel Co., San Francisco, Calif.
Duffin Iron Co., 37 W. Van Buren St., Chicago, Ill.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
Gage Structural Steel Co., Chicago, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Levinson Steel Co., 33 Pride St., Pittsburgh, Pa.
Midland Structural Steel Co., Cicero, Ill.
*Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Scully Steel Products Co., 1316 Wabansia Ave., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Uhl Construction Co., 6001 Butler St., Pittsburgh, Pa.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

STEEL (Tool)
Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Bissett Steel Co., The, 900 E. 67th St., Cleveland, O.
Carpenter Steel Co., Dept. 51, Reading, Pa.
Copperweld Steel Co., Warren, O.
Darwin & Milner, Inc., 1260 W. 4th St., Cleveland, O.
Disston, Henry, & Sons, Inc., 326 Tacony, Philadelphia, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Frasse, Peter A., & Co., Inc. 17 Grand St., New York City
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Jessop, Wm., & Sons Co., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Latrobe Electric Steel Co., Latrobe, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Broach & Mach. Co., 5600 St. Jean, Detroit, Mich.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Vanadium Alloys Steel Co., Latrobe, Pa.

STEEL BUILDINGS—See BRIDGES, BUILDINGS, ETC.

STEEL DOORS & SHUTTERS—See DOORS & SHUTTERS

STEEL FABRICATORS—See BRIDGES, BUILDINGS, ETC.

STEEL FLOATING AND TERMINAL EQUIPMENT
Dravo Corp. (Engin'r'g Works Div.), Neville Island, Pittsburgh, Pa.

STEEL PLATE CONSTRUCTION
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Belmont Iron Works, 22nd St., and Washington Ave., Philadelphia, Pa.
Bethlehem Steel Co., Bethlehem, Pa.

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General American Transportation Corp., 135 So. LaSalle St., Chicago, Ill.
Graver Tank & Mfg. Co., Inc., 4409-40 Tod Ave., E. Chicago, Ind.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Pollock, Wm. B., Co., The, 101 Andrews Ave., Youngstown, O.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

STELLITE
Haynes Stellite Co., Harrison and Lindsay Sts., Kokomo, Ind.

STENCILS (Spray and Sand Blast)
Matthews, James H., & Co., 3942 Forbes St., Pittsburgh, Pa.

STOKERS
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.

STONES (Honing)
Bay State Abrasive Products Co., Westboro, Mass.

STOPPERS (Cinder Notch)
Bailey, Wm. M. Co., 702 Magee Bldg., Pittsburgh, Pa.
Brosius, Edgar E., Co., Sharpsburg Branch, Pittsburgh, Pa.

STOPPERS (Rubber)
Rhoades, R. W., Metaline Co., 43 Third St., Long Island City, N. Y.

STORAGE EQUIPMENT
Graver Tank & Mfg. Co., Inc., 4409-40 Tod Ave., E. Chicago, Ind.
Lyon Metal Products, Inc., 7203 Madison Ave., Aurora, Ill.

STORAGE BATTERIES—See BATTERIES (Storage)

STRAIGHTENING MACHINERY
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Farquhar, A. B., Co., Ltd., Hydraulic Press Div., 175 Duke St., York, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Lewis Machine Co., 3450 E. 76th St., Cleveland, O.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Shuster, F. B., Co., The, New Haven, Conn.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.

SULPHURIC ACID
Cleveland-Cliffs Iron Co., The, Union Commerce Bldg., Cleveland, O.
New Jersey Zinc Co., 160 Front St., New York City.
Pennsylvania Salt Mfg. Co., Dept. S, Pennsalt Cleaner Div., Philadelphia, Pa.

SURFACE WELDING
Wall-Colmonoy Corp., 637 Buhl Bldg., Detroit, Mich.

SWAGING MACHINES
Etna Machine Co., The, 3400 Maplewood Ave., Toledo, O.

SWITCHES (Electric)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Electric Controller & Mfg. Co., The, 2700 E. 79th St., Cleveland, O.
General Electric Co., Schenectady, N. Y.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

TACHOMETERS
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.

TANK LININGS
Cellcote Co., 750 Rockefeller Bldg., Cleveland, O.
National Carbon Co., W. 117th St. and Madison Ave., Cleveland, O.
Nukem Products Corp., 70 Niagara St., Buffalo, N. Y.

TANKS (Gas Auxiliary)
Webb City & Carterville Foundry & Machine Works, Webb City, Mo.

TANKS (Pickling)
National Carbon Co., W. 117th St. and Madison Ave., Cleveland, O.
Nukem Products Corp., 70 Niagara St., Buffalo, N. Y.

TANKS (Storage, Pressure, Riveted, Welded)
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Bethlehem Steel Co., Bethlehem, Pa.
General American Transportation Corp., 135 So. LaSalle St., Chicago, Ill.
Graver Tank & Mfg. Co., Inc., 4409-40 Tod Ave., E. Chicago, Ind.
Pollock, Wm. B., Co., The, 101 Andrews Ave., Youngstown, O.
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.
Scaife Co., Ames St., Oakmont, Pa.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

TANKS (Wood or Steel, Rubber or Lead Lined)
American Hard Rubber Co., 11 Mercer St., New York City.

TAPPING MACHINES
National Automatic Tool Co., The, Richmond, Ind.

TAPS AND DIES
Greenfield Tap & Die Corp., Greenfield, Mass.
Landis Machine Co., Waynesboro, Pa.
National Acme Co., The, 170 E. 131st St., Cleveland, O.
Oster Mfg. Co., The, 2037 E. 61st St., Cleveland, O.

TERMINALS (Locking)
Thompson-Bremer & Co., 1644 W. Hubbard St., Chicago, Ill.

TERNE PLATE—See TIN PLATE

TESTING MACHINERY (Materials)
Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
National Broach & Machine Co., 5600 St. Jean, Detroit, Mich.

THERMIT WELDING
Metal & Thermit Corp., 120 Broadway, New York City.

THERMOMETERS
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stanton Ave., Philadelphia, Pa.

THREAD CUTTING TOOLS
Landis Machine Co., Waynesboro, Pa.
Oster Mfg. Co., The, 2037 E. 61st St., Cleveland, O.

TIE PLATES
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.

TIN PLATE
Bethlehem Steel Co. Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Weirton Steel Co., Weirton, W. Va.
Wheeling Steel Corp., Wheeling, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

TIN PLATE MACHINERY
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.
Wean Engineering Co., Warren, O.

TITANIUM
Titanium Alloy Mfg. Co., The, Niagara Falls, N. Y.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

TONGS (Chain Pipe)
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

TONGS (Rail Handling)
Cullen-Friestedt Co., 1308 S. Kilbourn Ave., Chicago, Ill.

TOOL BITS (High Speed)
Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
Disston, Henry, & Sons, Inc., 326 Tacony, Philadelphia, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Haynes Stellite Co., Harrison and Lindsay Sts., Kokomo, Ind.
Jessop Steel Co., 584 Green St., Washington, Pa.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.

TOOL HOLDERS
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

TOOLS (Pneumatic)
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.

TOOLS (Precision, Lathe, Metal Cutting, etc.)
Brown & Sharpe Mfg. Co., Providence, R. I.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Gisholt Machine Co., 1217 E. Washington Ave., Madison, Wis.
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

TOOLS (Steel-Cutting)
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

TOOLS (Tipped, Carbide)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

TOOLS (Turning, Boring and Facing)
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

TORCHES & BURNERS (Acetylene, Blow, Oxy-Acetylene)
Air Reduction, 60 E. 42nd St., New York City.
Linde Air Products Co., The, 30 E. 42nd St., New York City.
National Cylinder Gas Co., 205 W. Wacker Drive, Chicago, Ill.

TOWBOATS
Dravo Corp. (Engin'r'g Works Div.) Neville Island, Pittsburgh, Pa.

TOWERS (Transmission)
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.

TOWERS (Tubular Hoisting)
Dravo Corp., (Machinery Div.), 300 Penn Ave., Pittsburgh, Pa.

TRACK ACCESSORIES
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Foster, L. B., Co., Inc., P. O. Box 1647, Pittsburgh, Pa.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Oliver Iron & Steel Corp., So. 10th & Muriel Sts., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

TRACK BOLTS
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

TRAILERS
Mercury Manufacturing Co., 4140 S. Halsted St., Chicago, Ill.
Ohio Galvanizing & Mfg. Co., Penn St., Niles, O.

TRAILERS (Arch-Girder)
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

TRAMRAILS
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

TRANSMISSIONS—VARIABLE SPEED
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Nicholson, W. H., & Co., 177 Oregon St., Wilkes-Barre, Pa.

TRAPS (High Pressure Steam)
Nicholson, W. H., & Co., 177 Oregon St., Wilkes-Barre, Pa.

TRAPS (Steam)
Nicholson, W. H., & Co., 177 Oregon St., Wilkes-Barre, Pa.

TREADS (Safety)
Alan Wood Steel Co., Conshohocken, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Dravo Corp. (Machinery Div.), 300 Penn Ave., Pittsburgh, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tri-Lok Co., 0515 Butler St., Pittsburgh, Pa.

TROLLEYS
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Ford Chain Block Div., American Chain & Cable Co. Inc., 2nd & Diamond Sts., Philadelphia, Pa.
Reading Chain & Block Co., Dept. D-2, Reading, Pa.
Wright Mfg. Div. of American Chain & Cable Co., Inc., York, Pa.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

TRUCK CRANES
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.
Silent Hoist Winch & Crane Co., 849 63rd St., Brooklyn, N. Y.

TRUCKS AND TRACTORS (Electric Industrial)
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Baker-Raulang Co., The, 2167 W. 25th St., Cleveland, O.
Easton Car & Construction Co., Easton, Pa.
Elwell-Parker Electric Co., The, 4501 St. Clair Ave., Cleveland, O.
Mercury Manufacturing Co., 4140 S. Halsted St., Chicago, Ill.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

TRUCKS AND TRACTORS (Gasoline Diesel)
Silent Hoist Winch & Crane Co., 849 63rd St., Brooklyn, N. Y.

TRUCKS AND TRACTORS (Gasoline Industrial)
Baker-Raulang Co., The, 2167 W. 25th St., Cleveland, O.
Clark Tructractor Div., Clark Equipment Co., Battle Creek, Mich.
Elwell-Parker Electric Co., The, 4501 St. Clair Ave., Cleveland, O.
Mercury Manufacturing Co., 4140 S. Halsted St., Chicago, Ill.

TRUCKS (Dump-Industrial)
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Easton Car & Construction Co., Easton, Pa.

TRUCKS (Hydraulic Lift)
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.

TRUCKS (Industrial)
Easton Car & Construction Co., Easton, Pa.
Mercury Manufacturing Co., 4044-4140 S. Halsted St., Chicago, Ill.
Ohio Galvanizing & Mfg. Co., Penn St., Niles, O.

TRUCKS (Lift)
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Baker-Raulang Co., The, 2167 W. 25th St., Cleveland, O.

WHERE-TO-BUY

TRUCKS (Lift)—Con.
Clark Tructractor Div., Clark Equipment Co., Battle Creek, Mich.
Easton Car & Construction Co., Easton, Pa.
Elwell-Parker Electric Co., The, 4501 St. Clair Ave., Cleveland, O.
Mercury Manufacturing Co., 4140 S. Halsted St., Chicago, Ill.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

TUBE MILL EQUIPMENT
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Taylor-Wilson Mfg. Co., 1200 Thomson Ave., McKees Rocks, Pa.

TUBE WELDING MACHINES
Etna Machine Co., The, 3400 Maplewood Ave., Toledo, O.

TUBES (Boiler)
Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Bissett Steel Co., The, 943 E. 67th St., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Ohio Seamless Tube Co., Shelby, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Steel and Tubes Division, Republic Steel Corp., 226 E. 131st St., Cleveland, O.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Tubular Service Corp., 120 44th St., Brooklyn, N. Y.
Youngstown Sheet & Tube Co., The, Youngstown, O.

TUBES (Brass, Bronze, Copper, Nickel Silver)
American Brass Co., The, Waterbury, Conn.
Bridgeport Brass Co., Bridgeport, Conn.
Revere Copper & Brass, Inc., 222 Park Ave., New York City.

TUBES (High Carbon)
Ohio Seamless Tube Co., Shelby, O.
Steel and Tubes Division, Republic Steel Corp., 226 E. 131st St., Cleveland, O.
Tubular Service Corp., 120 44th St., Brooklyn, N. Y.

TUBING (Alloy Steel) (*Also Stainless)
*Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Bissett Steel Co., The, 943 E. 67th St., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
*National Tube Co., Frick Bldg., Pittsburgh, Pa.
Ohio Seamless Tube Co., Shelby, O.
Steel and Tubes Division, Republic Steel Corp., 226 E. 131st St., Cleveland, O.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Tubular Service Corp., 120 44th St., Brooklyn, N. Y.

TUBING (Copper, Brass, Aluminum)
American Brass Co., The, Waterbury, Conn.
Lewin-Mathes Co., E. St. Louis, Ill.
Revere Copper & Brass, Inc., 222 Park Ave., New York City.
Shenango-Penn Mold Co., 402 W. Third St., Dover, O.

TUBING (Flexible Metal)
Chicago Metal Hose Corp., 1315 S. Third St., Maywood, Ill.

TUBING (Monel)
Bundy Tubing Co., 10951 Hern Ave., Detroit, Mich.

TUBING (Seamless Flexible Metal)
American Metal Hose Branch of The American Brass Co., Waterbury, Conn.

TUBING (Seamless Steel)
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Columbia Steel Co., San Francisco, Calif.
Frasse, Peter A., & Co., Inc., 17 Grand St., New York City
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Ohio Seamless Tube Co., Shelby, O.
Pipe & Tube Products, Inc., 445 Communipaw Ave., Jersey City, N. J.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Steel and Tubes Division, Republic Steel Corp., 226 E. 131st St., Cleveland, O.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Tubular Service Corp., 120 44th St., Brooklyn, N. Y.
Youngstown Sheet & Tube Co., The, Youngstown, O.

TUBING (Square, Rectangular)
Ohio Seamless Tube Co., Shelby, O.
Steel & Tubes Division, Republic Steel Corp., 226 E. 131st St., Cleveland, O.
Tubular Service Corp., 120 44th St., Brooklyn, N. Y.

TUBING (Welded Steel)
Bundy Tubing Co., 10951 Hern Ave., Detroit, Mich.
Frasse, Peter A., & Co. Inc., 17 Grand St., New York City
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Ohio Seamless Tube Co., Shelby, O.
Republic Steel Corp., Dept. ST, Cleveland, O.
Revere Copper & Brass, Inc., 222 Park Ave., New York City.
Steel and Tubes Division, Republic Steel Corp., 226 E. 131st St., Cleveland, O.
Tubular Service Corp., 120 44th St., Brooklyn, N. Y.
Youngstown Sheet & Tube Co., The, Youngstown, O.

TUBULAR PRODUCTS
Bundy Tubing Co., 10951 Hern Ave., Detroit, Mich.
Ohio Seamless Tube Co., Shelby, O.
Steel and Tubes Division, Republic Steel Corp., 226 E. 131st St., Cleveland, O.
Tubular Service Corp., 120 44th St., Brooklyn, N. Y.

TUMBLING BARRELS (Coke Testing)
Brosius, Edgar E., Co., Sharpsburg Branch, Pittsburgh, Pa.

TUNGSTEN CARBIDE
Bissett Steel Co., The, 943 E. 67th St., Cleveland, O.
Haynes Stellite Co., Harrison and Lindsay Sts., Kokomo, Ind.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.

TUNGSTEN CARBIDE (Tools and Dies)
Firth-Sterling Steel Co., McKeesport, Pa.
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

TUNGSTEN METAL AND ALLOYS
Electro Metallurgical Co., 30 E. 42nd St., New York City.

TURBINES (Steam)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
General Electric Co., Schenectady, N. Y.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

TURBO BLOWERS—See BLOWERS

TURNTABLES
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.

TURRET LATHES—See LATHES (Turret)

TURRET LATHE CUTTERS (Carbide Tipped)
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

TWIST DRILLS
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, O.
Greenfield Tap & Die Corp., Greenfield, Mass.

UNIT HEATERS
Dravo Corp. (Machinery Div.) 300 Penn Ave., Pittsburgh, Pa.

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Sturtevant, B. F., Co., Hyde Park, Boston, Mass.

VALVE CONTROL (Motor Operated Units)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.

VALVE CONTROLS
Philadelphia Gear Works, Erie Ave. & G St., Philadelphia, Pa.

VALVES (Blast Furnace)
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.
Brosius, Edgar E., Co., Sharpsburg Branch, Pittsburgh, Pa.

VALVES (Blow-off)
Homestead Valve Mfg. Co., P. O. Box 20, Coraopolis, Pa.

VALVES (Brass, Iron and Steel)
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Galland-Henning Mfg. Co., 2747 So. 31st St., Milwaukee, Wis.
Reading-Pratt & Cady Div. of American Chain & Cable Co., Inc., Bridgeport, Conn.

VALVES (Check)
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Reading-Pratt & Cady Div. of American Chain & Cable Co., Inc., Bridgeport, Conn.

VALVES (Control—Air and Hydraulic)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Galland-Henning Mfg. Co., 2747 So. 31st St., Milwaukee, Wis.
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Homestead Valve Mfg. Co., P. O. Box 22, Coraopolis, Pa.
Nicholson, W. H., & Co., 177 Oregon St., Wilkes-Barre, Pa.
Racine Tool & Machine Co., Racine, Wis.

VALVES (Electrically Operated)
Atkins, E. C., & Co., 427 So. Illinois St., Indianapolis, Ind.
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Nicholson, W. H., & Co., 177 Oregon St., Wilkes-Barre, Pa.

VALVES (Gas and Air Reversing)
Blaw-Knox Co., Blawnox, Pa.

VALVES (Gate)
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Crane Co., The, 836 So. Michigan Ave., Chicago, Ill.
Reading-Pratt & Cady Div. of American Chain & Cable Co., Inc., Bridgeport, Conn.
Western Gas Div. Koppers Co., Fort Wayne, Ind.

VALVES (Globe)
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Reading-Pratt & Cady Div. of American Chain & Cable Co., Inc., Bridgeport, Conn.

VALVES (Hydraulic)
Bayard, M. L., & Co., 20th & Indiana Ave., Philadelphia, Pa.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Homestead Valve Mfg. Co., P. O. Box 20, Coraopolis, Pa.
Racine Tool & Machine Co., Racine, Wis.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

VALVES (Iron & Steel)
Galland-Henning Mfg. Co., 2747 So. 31st St., Milwaukee, Wis.

VALVES (Needle)
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Reading-Pratt & Cady Div. of American Chain & Cable Co., Inc., Bridgeport, Conn.

VALVES (Open Hearth Control—Oil, Tar, Steam & Air)
Nicholson, W. H., & Co., 177 Oregon St., Wilkes-Barre, Pa.

VALVES (Plug)
Homestead Valve Mfg. Co., P. O. Box 20, Coraopolis, Pa.

VALVES (Steam and Water)
Reading-Pratt & Cady Div. of American Chain & Cable Co., Inc., Bridgeport, Conn.

VALVES AND FITTINGS—See PIPE FITTINGS

VANADIUM
Electro Metallurgical Co., 30 E. 42nd St., New York City.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

VIADUCTS (Steel)—See BRIDGES, ETC.

WALKWAYS—See FLOORING—(Steel)

WASHERS (Iron and Steel)
Hubbard, M. D., Spring Co., 443 Central Ave., Pontiac, Mich.
Oliver Iron & Steel Corp., So. 10th & Muriel Sts., Pittsburgh, Pa.
Thompson-Bremer & Co., 1644 W. Hubbard St., Chicago, Ill.

WASHERS (Lock)
Garrett, George K., Co., 1421 Chestnut St., Philadelphia, Pa.
Thompson-Bremer & Co., 1644 W. Hubbard St., Chicago, Ill.

WASHERS (Non-ferrous and Stainless)
Garrett, Geo. K., Co., 1421 Chestnut St., Philadelphia, Pa.
Harper, H. M., Co., The, 2646 Fletcher St., Chicago, Ill.

WASHERS (Spring)
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Garrett, Geo. K., Co., 1421 Chestnut St., Philadelphia, Pa.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.
Thompson-Bremer & Co., 1644 W. Hubbard St., Chicago, Ill.

WATER FILTRATION & SOFTENING
Graver Tank & Mfg. Co., Inc., 4409-40 Tod Ave., E. Chicago, Ind.

WELDED STEEL CONSTRUCTION
Pollock, Wm. B., Co., The, 101 Andrews Ave., Youngstown, O.

WELDERS (Electric—Arc)
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Hobart Bros., Box ST—42, Troy, O.
Lincoln Electric Co., The, Cleveland, O.
Welding Equipment & Supply Co., 220 Leib St., Detroit, Mich.

WELDING
Bartlett-Hayward Div. Koppers Co., Baltimore, Md.
Bayard, M. L., & Co., 20th & Indiana Ave., Philadelphia, Pa.
Lincoln Electric Co., The, Cleveland, O.
Metal & Thermit Corp., 120 Broadway, New York City.
Scaife Co., Ames St., Oakmont, Pa.
Van Dorn Iron Works, 2685 E. 79th St., Cleveland, O.
Western Gas Div., Koppers Co., Ft. Wayne, Ind.

WELDING (Thermit)
Metal & Thermit Corp., 120 Broadway, New York City.

WELDING (Welded Machine Steel Bases)
Van Dorn Iron Works, 2685 E. 79th St., Cleveland, O.

WELDING DIES (Flash)
Mallory, P. R., & Co., 3029 E. Washington Ave., Indianapolis, Ind.

WELDING RODS (Alloys)
Alloy Rods Co., York, Pa.
American Agile Corp., 5806 Hough Ave., Cleveland, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
International Nickel Co. Inc., The, 67 Wall Street, New York City.
Lincoln Electric Co., The, Cleveland, O.
Maurath, Inc., 7311 Union Ave., Cleveland, O.
Metal & Thermit Corp., 120 Broadway, New York City
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Welding Equipment & Supply Co., 220 Leib St., Detroit, Mich.

WELDING RODS (Bronze)
American Brass Co., The, Waterbury, Conn.
Revere Copper & Brass, Inc., 222 Park Ave., New York City.
Welding Equipment & Supply Co., 220 Leib St., Detroit, Mich.

WELDING RODS (Hard Surfacing)
Lincoln Electric Co., The, Cleveland, O., Dept. Y-25.
Wall-Colmonoy Corp., 637 Buhl Bldg., Detroit, Mich. Dept. AC, Peoria, Ill.

WELDING RODS (Stainless)
Alloy Rods Co., York, Pa.
Lincoln Electric Co., The, Cleveland, O., Dept. Y-25.

WELDING RODS OR WIRE
Air Reduction, 60 E. 42nd St., New York City.
American Agile Corp., 5806 Hough Ave., Cleveland, O.
American Brass Co., The, Waterbury, Conn.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bridgeport Brass Co., Bridgeport, Conn.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Hobart Bros., Box ST—42, Troy, O.
Lincoln Electric Co., The, Cleveland, O.
Linde Air Products Co., The, 30 E. 42nd St., New York City.
Maurath, Inc., 7311 Union Ave., Cleveland, O.
Metal & Thermit Corp., 120 Broadway, New York City
National Cylinder Gas Co., 205 W. Wacker Drive, Chicago, Ill.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Revere Copper & Brass, Inc., 222 Park Ave., New York City.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Washburn Wire Co., Phillipsdale, R. I.
Welding Equipment & Supply Co., 220 Leib St., Detroit, Mich.
Wickwire Brothers, 189 Main St., Cortland, N. Y.
Wilson Welder & Metals Co., 60 East 42nd St., New York City.
Youngstown Sheet & Tube Co., The, Youngstown, O.

WELDING TIPS (Spot)
Mallory, P. R., & Co., 3029 E. Washington Ave., Indianapolis, Ind.

WELDING WHEELS (Seam)
Mallory, P. R., & Co., 3029 E. Washington Ave., Indianapolis, Ind.

WELDING AND CUTTING APPARATUS AND SUPPLIES (Electric)
General Electric Co., Schenectady, N. Y.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Hobart Bros., Box ST—42, Troy, O.
Lincoln Electric Co., The, Cleveland, O.
Mallory & Co., P. R., 3029 E. Washington Ave., Indianapolis, Ind.
National Cylinder Gas Co., 205 W. Wacker Drive, Chicago, Ill.
Welding Equipment & Supply Co., 220 Leib St., Detroit, Mich.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.
Wilson Welder & Metals Co., 60 E. 42nd St., New York City.

WELDING AND CUTTING APPARATUS AND SUPPLIES (Oxy-Acetylene)
Air Reduction, 60 E. 42nd St., New York City.
Linde Air Products Co., The, 30 E. 42nd St., New York City.
Mallory, P. R., & Co., 3029 E. Washington Ave., Indianapolis, Ind.
National Cylinder Gas Co., 205 W. Wacker Drive, Chicago, Ill.
Welding Equipment & Supply Co., 220 Leib St., Detroit, Mich.

WELL WATER SUPPLY SYSTEMS
Layne & Bowler, Inc., Memphis, Tenn.

WHEELS (Car and Locomotive)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.

WHEELS (Track)
National-Erie Corp., Erie, Pa.

WHEELS (Trolley)
Crosby Co., The, 183 Pratt St., Buffalo, N. Y.

WINCHES (Electric)
American Engineering Co., 2484 Aramingo Ave., Philadelphia, Pa.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

WINCHES (Electric, Gasoline, Diesel)
Silent Hoist Winch & Crane Co. 849 63rd St., Brooklyn, N. Y.

WIRE (Alloy Steel) (*Also Stainless)
*American Steel & Wire Co. Rockefeller Bldg., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Firth-Sterling Steel Co., McKeesport, Pa.
*Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
*Republic Steel Corp., Dept. ST. Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.

WIRE (Annealed, Bright, Galvanized)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Johnson Steel & Wire Co., Worcester, Mass.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wheeling Steel Corp., Wheeling, W. Va.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.
Youngstown Sheet & Tube Co., The, Youngstown, O.

WIRE (Barb)
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

WIRE (Cold Drawn)
Johnson Steel & Wire Co., Worcester, Mass.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.
Washburn Wire Co., 118th St. & Harlem River, New York City.

WIRE (High Carbon)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Washburn Wire Co., 118th St. and Harlem River, New York City.

WIRE (Music)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Frasse, Peter A., & Co., Inc. 17 Grand St., New York City
Johnson Steel & Wire Co., Worcester, Mass.
Roebling's, John A., Sons Co., Trenton, N. J.
Washburn Wire Co., 118th St. and Harlem River, New York City.

WIRE (Nickel Silver)
Seymour Manufacturing Co., The, Seymour, Conn.

WIRE (Phosphor Bronze)
Seymour Manufacturing Co., The, Seymour, Conn.

WHERE-TO-BUY

WIRE (Round, Flat, Square, Special Shapes)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Columbia Steel Co., Los Angeles, Calif.
Continental Steel Corp., Kokomo, Ind.
Johnson Steel & Wire Co., Worcester, Mass.
Page Steel & Wire Div., of American Chain & Cable Co., Inc., Monessen, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Washburn Wire Co., 118th St. and Harlem River, New York City.
Youngstown Sheet & Tube Co., The, Youngstown, O.

WIRE (Spring)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Washburn Wire Co., 118th St. & Harlem River, New York City.

WIRE (Stapling)
Continental Steel Corp., Kokomo, Ind.

WIRE (Stainless)
Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.

WIRE (Welding)—See WELDING RODS OR WIRE

WIRE AND CABLE (Electric)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
General Electric Co., Sec. G-2903, Appliance & Merchandise Dept., Bridgeport, Conn.
Graybar Electric Co., 420 Lexington Ave., New York City.
Roebling's, John A., Sons Co., Trenton, N. J.

WIRE CLOTH
Cyclone Fence Co., Waukegan, Ill.
Roebling's, John A., Sons Co., Trenton, N. J.
Wickwire Brothers, 189 Main St., Cortland, N. Y.

WIRE COILING TOOLS (Cemented Carbide)
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

WIRE COVERING MACHINES
Fidelity Machine Co., 3908-18 Frankford Ave., Philadelphia, Pa.

WIRE FORMS, SHAPES AND SPECIALTIES
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Columbia Steel Co., San Francisco, Calif.
Firth-Sterling Steel Co., McKeesport, Pa.
Hubbard, M. D., Spring Co., 443 Central Ave., Pontiac, Mich.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.

WIRE FORMING MACHINERY
Nilson, A. H., Machine Co., The, Bridgeport, Conn.

WIRE MILL EQUIPMENT
Fidelity Machine Co., 3908-18 Frankford Ave., Philadelphia, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Lewis Machine Co., 3450 E. 76th St., Cleveland, O.
Morgan Construction Co., Worcester, Mass.
Shuster, F. B., Co., The, New Haven, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

WIRE NAILS—See NAILS

WIRE PRODUCTS (*Also Stainless)
*American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Continental Steel Corp., Kokomo, Ind.
Hubbard, M. D., Spring Co., 443 Central Ave., Pontiac, Mich.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Leschen, A., & Sons Rope Co., 5909 Kennerly Ave., St. Louis, Mo.
Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Washburn Wire Co., 118th St. and Harlem River, New York City.
Wickwire Brothers, 189 Main St., Cortland, N. Y.
Youngstown Sheet & Tube Co., The, Youngstown, O.

WIRE ROPE AND FITTINGS (*Also Stainless)
American Cable Div. of American Chain & Cable Co., Inc., Wilkes-Barre, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Hazard Wire Rope Div. of American Chain & Cable Co., Inc., Wilkes-Barre, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Leschen, A., & Sons Rope Co., 5909 Kennerly Ave., St. Louis, Mo.
Macwhyte Co., 2912 14th Ave., Kenosha, Wis.
Roebling's, John A., Sons Co., Trenton, N. J.

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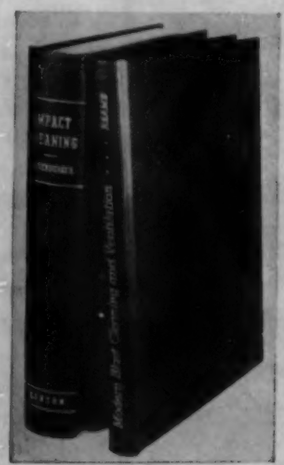

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